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Examining the Efficacy of Conjoint Behavioral Consultation for Health Behaviors of Children with Obesity

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EXAMINING THE EFFICACY OF CONJOINT BEHAVIORAL CONSULTATION FOR HEALTH BEHAVIORS OF CHILDREN WITH OBESITY

by

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EXAMINING THE EFFICACY OF CONJOINT BEHAVIORAL CONSULTATION FOR HEALTH BEHAVIORS OF CHILDREN WITH OBESITY

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An estimated 17.1% of children and adolescents ages 2-19 are obese (Ogden et al., 2006). Obesity is linked to adverse physical, psychosocial, and academic consequences for children. Treatments that collaboratively involve individuals in the child's microsystems (e.g., home, school) result in improved health outcomes. Few studies have *mutually* involved both parents and school personnel in treatments. Conjoint Behavioral Consultation (CBC; Sheridan & Kratochwill, 2008) is an indirect service-delivery model that joins microsystems to address child concerns, and provides a model for delivering comprehensive treatments to improve the health behaviors of children with obesity. No previous studies have investigated CBC for health behaviors. The purpose of this study is to examine the efficacy of CBC for improving child health behaviors and health status for children with obesity.

Four child participants and their parents and school personnel participated in a health behavior intervention implemented within CBC. Families and school personnel, together with a CBC consultant, assessed child health behaviors, designed and implemented a multi-component health behavior intervention, and evaluated intervention effects. Utilizing a multiple baseline design across behaviors, the intervention was introduced across dietary and physical activity behaviors in a staggered fashion over time for each child. The efficacy of the intervention implemented within CBC was assessed

via its effects on specified health behaviors and health status (i.e., BMI) of each child participant. Additionally, caregiver, school personnel, and child perceptions were assessed to evaluate social validity.

Overall, results of the study were varied. For most child participants, substantial changes were observed for dietary and physical activity behaviors at home and school. However, data appeared to vary across participants. It appeared that changes in health behaviors and BMI were higher for children whose parents and school personnel implemented treatment recommendations with high integrity. Social validity data indicated that parents, school personnel, and children found the CBC program effective. Future research should examine the effectiveness of CBC for health behaviors for a larger sample of children with obesity.

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CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

An estimated 17% of children and adolescents ages 2 to 19 years are obese, and the prevalence of obesity in school-aged children (i.e., ages 6 to 11) has increased 14.8% in the past 30 years (Ogden et al., 2006). As a result, obesity in childhood has become a widespread public health concern. Children with obesity are more likely to experience adult obesity, mortality, and a plethora of adverse physical, social, psychological, and emotional effects. This chapter provides a detailed review of the background literature of childhood obesity including the prevalence, consequences, and contributors of childhood obesity to provide a framework for understanding the utility and importance of identifying effective, evidence-based childhood obesity treatments. In addition, this chapter provides a review of literature investigating treatments for childhood obesity based in social cognitive, ecological systems, and behavioral theories. This review attempts to synthesize and critically examine the available research on treatment programs aimed at improving the health behaviors of children to better understand the effectiveness, interpretability, and practicality of such programs, as well as determine the need for future research. A specific service-delivery model (i.e., Conjoint Behavioral Consultation), will then be reviewed as a potential mechanism for the treatment of health behaviors of children with obesity.

Definition and Prevalence of Childhood Obesity

The term "obesity" denotes an excess of fat on the body. The most commonly utilized method to measure and qualify a person as obese is the Body Mass Index (BMI, or Quetelet index). BMI is an indirect measure of body fat computed from an

individual's height and weight (kg/m^2). BMI is highly correlated with other measures of body mass, such as dual-energy X-ray absorptiometry (DXA), a measure of body density (Goran, Driscoll, Johnson, Nagy, & Hunter, 1996; Gutin et al., 1996), skinfold thickness (Gutin et al., 1996), and ultrasonographic measurements of fat thickness (Semiz, Özgören, & Sabir, 2007). BMI is an easy-to-perform, inexpensive, and non-invasive alternative to direct measures of body fat (Semiz et al., 2007; Wang, 2004). Due to continued growth and development of children, obesity in children is derived from gender and age specific BMI charts based on national statistics to determine percentile rankings (Kuczmarski, Kuczmarski, & Roche, 2002a; Ogden et al., 2002). Children are considered *at risk for overweight* if their BMI is between the 85^{th} and 95^{th} percentiles and *overweight* if their BMI is at or over the 95^{th} percentile among children or adolescents of the same sex and age (Kuczmarski et al., 2002a; Kuczmarski et al., 2002b). Although the term "overweight" is used by Kuczmarski and colleagues (2002a; 2002b), more recently the Center for Disease Control, the American Obesity Association, and the American Academy of Pediatrics classify children with a BMI at or over the 95^{th} percentile as *obese*. As a result, for this study the term *overweight* will be used for children with a BMI between the 85^{th} and 95^{th} percentiles and *obese* will be considered for children with a BMI at or above the 95^{th} percentile.

The Center for Disease Control (CDC) estimated 17.1% of children and adolescents 2 to19 years of age were obese (Ogden et al., 2006). However, the prevalence of obesity in children and adolescents varies by sex and ethnicity. An estimated 20% of youth who were non-Hispanic black and 19.2% of youth who were Mexican American were identified as obese by Ogden and colleagues (2006).

Additionally, 18.2% of male youth and 16% of female youth were obese (Ogden et al., 2006). The prevalence of obesity in children and adolescents is continuing to increase at a rapid rate. Obesity in youth has increased 3.2% between 1999 and 2004, in just 5 years, and the prevalence of obesity in school-aged children (i.e., ages 6 to 11) has increased 14.8% in the past 30 years (Ogden et al., 2006; Ogden, Flegal, Carroll, & Johnson, 2002).

Childhood obesity and its consequences are not limited to childhood. Childhood obesity and associated outcomes may perpetuate into adulthood at rates of up to 77% (Freedman et al., 2005; Singh, Mulder, Twisk, van Mechelen, & Chinapaw, 2008; Whitaker, Wright, Pepe, Seidel, & Dietz, 1998). This high rate is alarming, as the association of childhood obesity with adult obesity results in an increased likelihood of obesity-related morbidity and mortality in adulthood (Dietz, 1998; Maffeis & Tatò, 2001; Must & Strauss, 1999).

Consequences of Childhood Obesity

Although the harmful effects of obesity are more prevalent in adults, early morbidities and precursors to adult diseases are becoming more evident in childhood. Obesity is linked to numerous adverse physical, psychosocial, academic, and economic consequences for children and the communities in which they reside. Research investigating the adverse effects of childhood obesity in youth is reviewed briefly below.

Physical

Obesity in childhood is associated with a plethora of physical consequences. Potential short-term physical effects include orthopedic abnormalities, gallstones, hepatitis, sleep apnea, increased intracranial pressure, intracranial hypertension, asthma, insulin resistance, liver disease, and menstrual abnormalities (Dietz, 1998; Must &

Strauss, 1999). Childhood obesity and associated consequences perpetuate into problems in adulthood (Singh et al., 2008, for a review). As a result, childhood obesity is linked to many, potentially harmful, long-term outcomes. The association of childhood obesity with adult obesity results in an increased likelihood of obesity-related morbidity in adulthood, including high blood pressure, gallbladder disease, osteoarthritis, high cholesterol, type 2 diabetes, cardiovascular disease, coronary heart disease, and several types of cancers (i.e., endometrial, breast, and colon; Baker, Olsen, & Sørensen, 2007; Dietz, 1998; Must & Strauss, 1999; Virdis et al., 2009).

Psychosocial

Psychosocial problems are becoming increasingly recognized as the most common consequence of childhood obesity (Dietz, 1998). Children with obesity suffer from numerous comorbid psychosocial conditions (Warschburger, 2005), and the number of psychosocial problems is associated with health status in children (Gibson et al., 2008). Documented social effects include bullying (Gibson et al., 2008; Janssen, Craig, Boyce, & Pickett, 2004), prejudices and stigmatization (Phillips & Hill, 1998; Puhl & Latner, 2007), lower parent-reported self-esteem (Gibson et al., 2008; Hesketh, Wake, & Waters, 2004), and lower child perceptions of social acceptance and physical appearance (McCullough, Muldoon, & Dempster, 2009). Children are more likely to rate other children who are overweight as less favorable and less attractive than children who are thin (Kraig & Keel, 2001; Phillips & Hill, 1998), regardless of the child rater's BMI (Kraig & Keel, 2001). Additionally, youth with obesity are at greater risk of being victims of relational and overt bullying than their nonobese peers (Janssen et al., 2004). Sixty-three percent of girls with obesity report being teased by their peers and weight-

teasing is significantly associated with more binge-eating behaviors (Neumark-Sztainer, Falkner, Story, Perry, & Hannan, 2002). Assessments of quality of life have also been found to be impacted in obese youth (Gibson et al., 2008; Schwimmer, Burwinkle, & Varni, 2003). Children and adolescents with obesity report their quality of life as significantly lower than those without obesity and similar to youth diagnosed with cancer (Schwimmer et al., 2003). However, research on childhood obesity and poor self-esteem and self-perceptions is mixed (e.g., Braet, Mervielde, & Vandereycken, 1997; French, Story, & Perry, 1995; Gibson et al., 2008; Nowicka et al., 2009; O'Dea, 2006; Phillips & Hill, 1998).

Correlational research links psychopathology to childhood obesity for a variety of child and adolescent populations. Research indicates that obesity in childhood is related to suicidal ideation (Whetstone, Morrissey, & Cummings, 2007) and psychopathology (Britz et al., 2000; Erermis et al., 2004; Mustillo et al., 2003). Teachers have rated obese girls as having significantly more externalizing and internalizing behaviors than girls without obesity (Judge & Jahns, 2007). Body fat in children is also related to parent report of internalizing problems in African American children, including withdrawn behavior, somatic complaints, anxiety/depression, social problems, thought problems, and attention problems (Davis, Young, Davis, & Moll, 2008). In Australia, Gibson et al. (2008) supported these studies by documenting that higher child BMI scores are associated with increased depression (particularly for girls) and internalizing and externalizing problems, and added that BMI was also associated with increased body dissatisfaction and frequency of eating disorder symptoms (Gibson et al., 2008). When examining these relationships further, body dissatisfaction and pressure to be thin was

found to mediate the relationship between adiposity and depressive symptoms for Canadian adolescent girls (Chaiton et al., 2009). Although research links childhood obesity and psychopathology, this research is correlational and a causal relationship has not been established.

Academic

Due to the numerous identified physical and psychosocial risks associated with childhood obesity, it is inevitable that children's academic achievement is affected as well (see Taras & Potts-Datema, 2005 for review). Obesity in children is associated with reduced math and reading test scores (Datar & Sturm, 2006; Judge & Jahns, 2007), approaches to learning (i.e., behaviors that affect the ease with which children benefit from the learning environment), and increased school absences (Datar & Strum, 2006). Additionally, Mo-suwan, Lebel, Puetpaiboon, and Junjana (1999) detected a negative association between being overweight and becoming overweight in adolescence with grade point average (GPA) in Thailand. Also, Xie et al. (2006) found that Chinese adolescent girls who perceived themselves as overweight (both correctly and incorrectly) reported lower GPA and academic achievement than those that did not perceive themselves as overweight.

Economic

The effects of high rates of childhood obesity stretch beyond the individual child and his or her family to impact society as a whole by causing a financial strain on the health-care system. In 2003, an estimated 6% of the total health-care expenses in the United States, or $75 billion, was spent on medical expenditures attributable to preventive, diagnostic, and treatment services related to obesity (Finkelstein, Fiebelkorn,

& Wang, 2003), and future projections suggest costs attributable to services for those who are overweight or obese will double each decade (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008). In addition, obesity-related expenditures include indirect (non-medical) costs attributable to obesity such as reduced workforce productivity via absenteeism (see review by Trogdon, Finkelstein, Hylands, Dellea, & Kamal-Bahl, 2008). In a study investigating health care use by children with obesity, Hering, Pritsker, Gonchar, and Pillar (2009) found that children who are obese utilize the health care system at a higher rate than matched, control children. As a result, there is a significant need to implement effective treatment programs for children with obesity to improve the health of our children and communities, prevent future health concerns related to obesity and, in-turn, reduce health care costs.

Obesity in childhood is related to a plethora of adverse effects for children, which perpetuate throughout adulthood. Adverse effects permeate most areas of life and are related to physical, psychosocial, and academic effects. It is clear that there is a critical need to establish evidence-based interventions to combat the rampant increase in childhood obesity and its related consequences.

Factors Contributing to Childhood Obesity

Storing excess body fat results from an imbalance of energy in the body over time, that is, energy intake is greater than energy expenditure (Goran & Treuth, 2001). It is clear that some children are more vulnerable to an energy imbalance than others and numerous factors contribute to their vulnerability, due to both nature and nurture. Identifying specific factors contributing to the development of obesity is complex and challenging, and the unique and combined influence of each potential source remains

unclear when explaining the multifaceted condition of obesity. Most studies examining contributors to obesity remain solely correlational, and no causal link can be assumed. The following is a brief overview of the several factors identified as contributors to the development of obesity in childhood, including family factors, school contributions, physical inactivity, and nutrition. However, this is not an exhaustive list of possible contributors to childhood obesity and should be considered narrow in its scope.

Family Factors

Parents control a child's environment by granting or preventing access to foods and activities and modeling food intake habits. Much of the research on the influence of family factors on childhood obesity have investigated how families impact the dietary intake of children. Ineffective use of parental dietary regulation may lead to poor outcomes for children. For example, parent-child feeding strategies are associated with the child's food preferences and feeding habits, which, in turn, is related to the child's weight (Fisher & Birch, 1999; Ventura & Birch, 2008). However, a literature review by Faith, Scanlon, and Birch (2004) found that most studies investigating parent-child feeding strategies were cross-sectional and could not distinguish whether feeding strategies predicted unhealthy eating behaviors and weight gain or if the child's existing unhealthy eating habits and weight status elicited more parental control of food intake. Family behaviors may also affect rate of food intake. Laessle, Uhl, and Lindel (2001) found that children who are obese eat at a faster rate than their non-obese peers, but only when their mothers were present. Therefore, a family prone to eating quick meals may be more likely to have a child who is obese. Maternal feeding behaviors such as fat intake, concern about child's weight, and pressure to eat also influences child food intake

and result in excessive child weight gain (Nguyen, Larson, Johnson, & Goran, 1996; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). Faith and colleagues (2004) suggested that excessive feeding restriction by parents may backfire by leading to increased desire for restricted foods when they are available, as evidenced by the association of high food restrictions with increased child energy intake and body weight.

Research has also identified family behavioral patterns that may contribute to child weight status. Children who are obese whose families watch a lot of television may be more susceptible to media depictions of food and weight. Exposure to food advertisements on television promotes unhealthy food consumption (Halford, Gillespie, Brown, Pontin, & Dovey, 2004). In fact, Zimmerman and Bell (2010) found that watching television with commercials is associated with child BMI, and watching television without commercials (e.g., educational television, DVDs) had no association with BMI, possibly suggesting that food advertisements may significantly influence children's health-related choices or provide an opportunity for children to get a snack. BMI is also linked with multiple other eating behaviors, including a negative relationship with food avoidant behaviors (i.e., slowness in eating and food fussiness), and a positive association with food approach behaviors (i.e., food responsiveness, enjoyment of food, emotional overeating, and a desire to drink) in English children (Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009).

Furthermore, children who have families that prepare and eat dinner together, watch less television, and regularly get sufficient sleep have a lower prevalence of obesity than children whose families do not have these behavioral patterns (Anderson & Whitaker, 2010; Chaput, Brunet, & Tremblay, 2006; Taveras et al., 2005; Wells et al.,

2008). For those families that regularly eat together at home, the quality of children's nutritional intake is also improved, including reduced consumption of calorie-dense fast foods and higher intake of fruits and vegetables (Gillman et al., 2000; Neumark-Sztainer et al., 2003). However, the presence of a television while eating may reverse the positive nutritional effects (i.e., less fruits and vegetables) of eating together as a family in the home (Fitzpatrick, Edmunds, & Dennison, 2007).

Family demographic factors also appear to play a role in the development of obesity in children. Correlational studies have identified that children with obese parents were more likely to be obese themselves (Davis et al., 2008; Forshee, Anderson, & Storey, 2009; Gibson et al., 2007; Moens, Braet, Bosmans, & Rosseel, 2009). The link between a mother's adiposity and her child's may be attributable to genetic and/or behavioral patterns in their shared environment. Having a single parent-family has also been associated with increased BMI in children (Gibson et al., 2007), as well as the number of children in the family (Moens et al., 2009). However, this has been contradicted in other research indicating that child BMI may be related to fewer people living in the home (Gibson et al., 2007).

School Contributions

Children spend a large portion of their daily life in schools (Hofferth & Sandberg, 2001). As a result, it is important to note how this environment may be significantly contributing to the increase and perpetuation of childhood obesity. Children eat at least one meal per school day in the school setting. At this time, there is no evidence that food service programs (e.g., National School Lunch Program, School Breakfast Program) contribute to overweight among children (Hofferth & Curtin, 2005). In fact, participation

in the School Breakfast Program is associated with lower BMI, particularly among White students (Gleason & Dodd, 2009). However, food choices at school are not limited to meals provided by food service programs. Youth can often buy foods à la carte, or from vending machines, school stores, or snack bars. The availability of à la carte options is associated with fewer servings of fruit and vegetables and more saturated fat and the presence of vending machines is associated with less consumption of fruits (Kubik, Lytle, Hannan, Perry, & Story, 2003). Attending a school with no à la carte offerings, school stores, or snack bars significantly reduces middle and high school students' intake of sugar-sweetened beverages (Briefel, Crepinsek, Cabili, Wilson, & Gleason, 2009). Furthermore, children who buy food items from vending machines at school 3 or more days per week are more likely to have no limitations regarding accessing vending machines, consume more soda and candy, and choose pizza or fried food for lunch (Thompson, Yaroch, Moser, Finney Rutten, & Agurs-Collins, 2010). As expected, availability of vending machines with low-nutrient, calorie-dense foods and offering French fries or dessert more than once per week at school is associated with higher BMI scores in elementary school children (Fox, Dodd, Wilson, & Gleason, 2009).

In addition to poor nutritional choices, physical inactivity at school may also contribute to the rise in childhood obesity. Datar and Sturm (2004) found that one additional hour of physical education (PE) in 1st grade reduces BMI among girls who were overweight or at-risk for overweight in Kindergarten. However, Cawley, Meyerhoefer, and Newhouse (2007) identified an association between the amount of time students were physically active during PE and days per week girls are involved in vigorous activity or strength-building, but found no evidence of reduced BMI. Similarly,

Wardle, Brodersen, and Boniface (2007) compared students in schools offering one, two, or three PE classes per week and found that more offerings of PE were associated with lower adiposity in boys, but no differences in the number of students classified as obese. In addition to organized physical activity efforts (e.g., PE classes), students may also reduce their risk of becoming obese by participating in informal opportunities to be active. For example, students in Turkey who walk to and from school have reduced BMI scores (Ozdemir & Yilmaz, 2008).

Physical Inactivity

Many research studies have continued to replicate the connection between physical inactivity and obesity. Obese children report lower levels of physical activity and are involved in fewer community-based physical activity programs (Trost et al., 2001). For children, "screen time," or activities in front of a screen including watching television, playing videogames, and using the computer are common pastimes. Increased "screen time" is associated with obesity in children (Crespo et al., 2001; Tremblay & Willms, 2003), sedentary behavior (Lowry, Wechsler, Galuska, Fulton, & Kann, 2002; Tremblay & Willms, 2003), higher energy intake (Crespo et al., 2001), poorer nutrition (Lowry et al., 2002), and a slower basal metabolism (Klesges, Shelton, & Klesges, 1993). Although these studies are primarily cross-sectional, longitudinal studies also support the association between TV watching and childhood obesity (Gortmaker et al., 1996; O'Brien et al., 2007; Proctor et al., 2003; Zimmerman & Bell, 2010).

It is evident that inactivity is associated with higher rates of obesity and unhealthful behaviors. Alternatively, exercise is linked to better health in children. Physically active behavior and participation in sports are negatively associated with being

obese in childhood (Temblay & Willms, 2003). Additionally, children who are not obese spend more time than their obese peers engaging in physical activity and are more active during opportunities for choice activities such as those engaged in outside of school (Page et al., 2005). Adding physical activity can also help improve the weight status of children (Datar & Sturm, 2004). Interestingly, physical activity level, rather than type of food intake, is negatively associated with body fat in preschoolers, indicating that physical activity may be more influential in combating obesity than food intake and may serve as an important point of change to prevent or treat childhood obesity (Atkin & Davies, 2000).

Nutrition

As the prevalence of obesity in children skyrockets, their portion sizes are also increasing (Nielsen & Popkin, 2003). Larger portion sizes results in more calorie intake. Fisher, Rolls, and Birch (2003) found that children who were given large portion sizes (i.e., double age-appropriate portion) ate 25% more than those given age-appropriate portions. However, children allowed to serve themselves ate more appropriate amounts, eating 25% less than when served a large portion. Although large portion size may result in risk for obesity, more frequent meal consumption has a positive effect on obesity. The frequency of meals eaten daily by children is negatively related to total adiposity, central fat deposition (Barba, Troiano, Russo, & Siani, 2006), and BMI scores in girls (Franko et al., 2008).

The quality of children's diets may also contribute to obesity. Children in the United States have a high intake of sugar, mostly from soft drinks. Adolescent consumption of soft drinks and fried potatoes have increased sharply over a 30 year

period (Cavadini, Siega-Riz, & Popkin, 2000). For every additional serving of sugary beverages consumed, both BMI and frequency of obesity in children significantly increase, regardless of initial BMI, diet, TV watching, and physical activity (Ludwig, Peterson, & Gortmaker, 2001). Frequently eating at fast food restaurants is associated with poor nutritional intake in children (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; French, Story, Neumark-Sztainer, Fulkerson, & Hannan, 2001). However, this has been disputed by French et al. (2001), who found no association between frequency of fast food consumption and overweight status.

In spite of large portions and high intake of soft drinks and fast food, some research indicates that children are not consuming more calories (see Rolland-Cachera & Bellisle, 2002 for a review). Additionally, an association was not found between nutritional and energy intake and body size (Davies, 1997). However, this conclusion was challenged in a more recent study by Boumtje, Huang, Lee and Lin (2005), which found that a high intake of soft drinks, fats/oils, and sodium was positively associated with the probability of developing obesity in childhood.

Overall, the research on the association with food intake and childhood obesity is mixed and limited to correlational methods, limiting interpretability. This may be due to a variety of methodological differences, including using cross-sectional versus longitudinal designs and measurement methods for dietary intake. Mixed research on food intake and obesity may indicate that physical activity/sedentary behaviors play a larger role in child energy imbalance than energy intake.

There are numerous potential contributors to the development of childhood obesity, including (but certainly not limited to) family factors, school contributors,

physical inactivity, and nutrition. The explanation of childhood obesity is not limited to one source; rather, it is multifaceted and is likely influenced by a combination of contributors. As a result, intervention programs that only target one aspect of childhood obesity may be limited in their effects. It is important to recognize obesity as a multidimensional problem to inform the development of multifaceted intervention programs and target multiple contributors to the development of childhood obesity.

Theoretical Framework

Due to the complex, multifaceted causes and consequences of childhood obesity, and the severity of its incidence and expansion, it is necessary to identify effective treatments to address childhood obesity. These treatments should be grounded in a theoretical framework to inform their design, purpose, and effectiveness. Three interrelated theories have been seminal in designing treatments for changing behavioral patterns in children: Ecological Systems Theory, Behavioral Theory, and Social Cognitive Theory. Ecological, behavioral, and social-cognitive theories emphasize the importance of changeable environmental systems, people, and events that shape children's behaviors. These theories provide a framework for investigating treatments for childhood obesity.

Ecological Systems Theory

Childhood obesity is a complex problem grounded in a set of variables that extend beyond the child and his/her physiological status and includes factors in the home and school environments which impact behavior. Ecological theory provides a conceptual model for the context in which children develop and the influential relationships among multiple environmental factors (Bronfenbrenner, 1977). Multiple systems in which

children are embedded are interactive and each affects one another. The interrelated systems influencing children's lives can be conceptualized as layers of increasing levels of proximity to the child. The *microsystem* is the layer closest to the child and represents the system within which a child regularly functions (e.g., home, school, childcare). The microsystem includes the daily structures and interactions a child has with his or her immediate surroundings. Relationships in the microsystem are bidirectional, meaning that the parents in the home setting may influence the child's behavior (e.g., cooking and/or buying food, encouraging child to eat), and the child may also influence the parents' behavior (e.g., "Please… can we order pizza for the sleepover?"). The *mesosystem* provides the connection and interactions between the microsystems. For example, this layer includes relationships and communication patterns between the child's teacher and parents. The *exosystem* includes the larger social context and does not directly impact the child, but influences the microsystems in which the child is rooted. For example, the exosystems may include a school administrator's decisions regarding length or number of recesses. Lastly, the outermost layer is the *macrosystem*. The macrosystem includes cultural values, customs, and law that often have a cascading effect impacting all other systems. For example, federal policy (e.g., National School Lunch Program, Food Stamp Program, WIC) may impact school procedures and curriculum as well as family functioning.

Traditional medical models addressing obesity focus on behavioral weight control by the individual child as a sole treatment target (Sharma, 2006). However, for children, environments have a significant influence on their health behaviors and choices. Families and school personnel in the child's microsystem are the vehicles to child health

by providing or limiting access to food and activities. Thus, there is a dire need to identify effective, supportive treatment approaches aimed at promoting healthy behaviors by systematically engaging adults within the child's microsystems (i.e., families and school personnel) who are responsible for controlling the environment within which children live. Additionally, the child's mesosystem, or the interactions and relationships among the various microsystems (e.g. home and school), may be a significant point of intervention to promote child health behaviors in a coordinated fashion. A systems approach to this childhood epidemic is crucial to produce significant, enduring improvements in child health behaviors and impact its prevalence in our communities.

Behavioral and Social Cognitive Theories

Similar to ecological systems theory, behavioral theory emphasizes that behaviors are learned based on interactions with the immediate environment. Behavioral theory focuses on changing specific, overt, observable behaviors, rather than factors "within the child" that are often unchangeable, such as genetics, socioeconomic level, or minority status. It is based upon B. F. Skinner's theory that learning results in a change in overt behavior in response to environmental events. Environmental stimulants occurring in tandem with a behavior are described as antecedents (occurring prior to the behavior) and consequences (events following the behavior; Miltenberger, 2008). To understand and change behavior, behavioral theory emphasizes evaluating and modifying potential antecedents and consequences of the behavior. Children learn or change their behaviors by encountering and developing expectations of environmental consequences. Environmentally conditioned behavioral associations are used to change and maintain behaviors, such as weight loss. Therefore, behavior change relies on environmental

conditions to be manipulated in the child's environment to foster behavioral change and learning.

Behavioral theory is grounded in principles of social cognitive theory, including utilization of reinforcement and punishment (i.e., operant conditioning), modeling, observational learning, and cognitions to alter behavior (Bandura, 1962). Social learning, or social-cognitive theory, also emphasizes the importance of reciprocal relationships between the child and his or her environment (e.g., parents and school staff) resulting in the formation of future behavioral expectations. The child must value the potential outcomes that may occur as a result of performing a behavior. For example, increasing exercise may result in feeling more energized, and improved cardiovascular capacity. According to this theory, reinforcement can be accomplished through direct behavioral reinforcement, vicarious reinforcement (i.e., observe behavior reinforcement in others), or self-management (i.e., record-keeping of own behavior). The importance of education is emphasized as a child must have the prerequisite behavioral capability, or the knowledge and skills necessary to demonstrate a behavior. Therefore, health education may be an important component of treatment programs for childhood obesity to ensure that children have the knowledge base and capability to perform healthy behaviors.

Behaviorism and social cognitive theories have had a major impact on the development of behavior modification practices with children. Behavior modification combines conditioning and modeling to reduce undesirable behaviors and increase desirable behaviors. Research on behavioral modification techniques for addressing childhood obesity in comparison to alternative treatments demonstrates that behavior modification results in greater weight change (Epstein et al., 1985; Graves, Meyers, &

Clark, 1988). Although research has supported the efficacy of behavioral modification for treating childhood obesity, little research has explicitly articulated the application of ecological systems theory in childhood obesity treatment efforts. However, research *has* examined the role of microsystems (i.e., schools and families) as facilitators of behavioral change. For example, Golan and colleagues (1998) found that a family-based approach targeting the home microsystem (i.e., focusing on parents as agents of change) resulted in a significantly greater weight reduction in children compared with a treatment approach targeting children only. However, no prior research has addressed the mesosystem, or interactions between home and school. Overall, an ecological systems, behavioral, and social-cognitive conceptualization of child health behaviors provides a valuable framework for treating childhood obesity. Specifically, research investigating intervention programs aiming to change specific, observable behaviors in the mesosystem are needed.

Interventions for Children with Obesity

Due to the high prevalence rates of obesity (Ogden et al., 2006), the staggering percentage of persistence into adulthood (Freedman et al., 2005; Whitaker et al., 1997), and the poor health consequences that result from childhood obesity (e.g., Dietz, 1998; Must & Strauss, 1999), the identification of effective intervention programs grounded in theory is necessary to sustain the healthy lives of children. An ecological, behavioral, and social cognitive perspective focuses on child health behaviors in relation to interactions with their immediate environment. Previous interventions have utilized various techniques to target a variety of health behaviors and have utilized a variety of microsystems including homes and schools. Intervention programs can be divided by

those that have included large populations of children regardless of weight status as well as those specifically targeting children with obesity. Universal programs that target all children in a particular population (e.g., school) are *prevention programs*, and those programs aimed at children who are already overweight or obese are *treatment programs*. To provide a comprehensive background of programs available to children and to better understand the important and unique contribution of treatment programs, prevention programs are briefly reviewed first.

Prevention Programs

Prevention efforts are aimed at preventing *all* children from becoming obese. The goals of prevention programs are to provide education and training to teach healthy lifestyle skills to a wide range of children, not just those with a particular problem (e.g., obesity) and to decrease the amount of children needing intense, individualized treatments. Most prevention programs for childhood obesity are conducted within the schools; however, there is some evidence of the efficacy of family-based prevention efforts as well.

Family-based prevention programs. Some efforts to prevent childhood obesity have been implemented at home or after school. However, this environment is rarely a focus of preventative interventions and is typically utilized for the treatment of children who are already obese or at-risk for obesity. Stolley and Fitzgibbon (1997) designed an intervention for low-income, African-American girls and their mothers. Participants were randomly assigned to a 12-week health education program at a community-based setting or a control group. The health education group received information on the importance of eating a low-fat, low-cholesterol diet and increasing activity. Results

indicated significant group differences in saturated fat intake and percentage of calories from fat. The *GEMS* study (Robinson et al., 2003) examined the efficacy of an after-school dance intervention and five home-based lessons to reduce TV viewing for African-American girls. The control group received nutrition education information. For the treatment group, the intervention demonstrated significantly lower BMI, lower waist circumference, increased after-school physical activity, reduced television viewing, less concern about weight, and improved grades. In a review of prevention programs, Doak, Visscher, Renders, and Seidell (2006) found that all three reviewed programs with the goal to reduce television viewing were effective. This suggests that a home component may be an important intervention target, particularly reducing sedentary activities and increasing exercise.

At this time, very few documented family-based programs exist to prevent childhood obesity. Interestingly, most family-based programs set in the community have focused on girls, most of whom were African American, so the generalizability of these programs is limited. More research is necessary before conclusions can be drawn regarding the effectiveness of family-based prevention interventions.

School-based prevention programs. Most current, school-based programs targeting childhood obesity are prevention programs. These universal prevention efforts target entire schools, rather than targeting just those students with obesity. Schools are an ideal location to implement prevention efforts due to their access to all children, emphasis on education, and opportunities for physical activity and food consumption. Several reviews have examined the effectiveness of school-based prevention programs (e.g., Boon & Clydesdale, 2005; Campbell, Waters, O'Meara, & Summerbell, 2001; Cook-

Cottone, Casey, Feeley, & Baran, 2009; Doak et al., 2006; Pyle et al., 2006; Sharma, 2006; Veugelers & Fitzgerald, 2005). Successful prevention programs have used a combination of techniques including behavior modification, nutrition education, and increasing daily physical activity (Doak et al., 2006; Pyle et al., 2006). Reviews of the literature of school-based prevention programs showed a wide variety of selection criteria, number of program components and targets, sample size, attrition rates, program duration, and outcome measures making it difficult to directly compare the efficacy of prevention programs. After a review of school-wide prevention programs Campbell and colleagues (2001) and Pyle and colleagues (2006) both reported mixed effectiveness of school-based programs and limited investigation of program maintenance. However, Doak et al. (2006) found that 68% of 25 reviewed school programs were effective based on a significant reduction in BMI and/or skinfold measurements compared to a control group. Four of these programs demonstrated effectiveness via significant differences in BMI *and* skinfold measures, and all programs included a physical activity component. Sharma (2006) reported modest changes in health behaviors across 11 studies. However, behavioral changes did not always translate to health status changes, as obesity prevalence and outcome measures (e.g., BMI, triceps skin-fold thickness, waist circumference) were mixed. Veugelers and Fitzgerald (2005) compared excess body weight, diet, and physical activity in 5^{th} grade students in Nova Scotia schools with and without school nutrition programs. Students from schools participating in nutrition program exhibited lower rates of overweight and obesity, consumed more fruits and vegetables and lower fat intake, had higher dietary quality index scores, and reported

being more physically active than other schools. Overall, Cook-Cottone and colleagues (2009) reported small effects on BMI for prevention programs.

Because most reviews have mixed outcomes for children, Cook-Cottone and colleagues (2009) examined multiple moderating factors that may help explain outcomes in a meta-analysis. It appeared that prevention programs targeting children in upper elementary and lower middle school were the most effective (Cook-Cottone et al., 2009; Sharma, 2006). In addition, the most effective programs were long in duration, involved parents in a more intensive role, encouraged nutritional change, reduced sedentary behavior, and involved collaboration between intervention specialist and teachers.

A few large-scale school-based prevention programs have received a substantial amount of investigation (Caballero et al., 2003; Gortmaker, 1999; Marcus et al., 2009). For example, the *Pathways* program is a three-year, multi-component intervention developed for 1704 8 to 11-year-old Native American children in 41 elementary schools across 3 states (Caballero et al., 2003; Going et al., 2003; Steckler et al., 2003). The study was a randomized, controlled trial of a multi-component intervention including classroom education, changes in school food, physical activity, and family involvement. No significant difference in percent body fat was observed between control and treatment groups; however, the participants in the treatment schools reported improvements in health education and consumption of fewer calories than children at the control schools (Caballero et al., 2003).

A second example of a school-based prevention program is *Planet Health*, a program for middle school students in 5 schools. The goals of *Planet Health* were to increase physical activity, decrease television viewing, and improve nutrition (Gortmaker

et al., 1999). The randomized, controlled investigation significantly reduced the prevalence of obesity, reduced sedentary behavior, and increased fruit and vegetable consumption in girls. The intervention program was reported to be feasible and acceptable by 129 teachers in six public schools (Wiecha et al., 2004).

Third, *STOPP* is a school-based obesity prevention program conducted in Stockholm, Sweden that was examined via a 4-year, randomized, controlled design (Marcus et al., 2009). The *STOPP* program, targeting healthy eating and increased physical activity at school and reduced sedentary activities during an after-school program, resulted in reduced prevalence of obesity and healthier eating habits at home for participants in treatment schools (Marcus et al., 2009). However, there was no significant difference in change in BMI or physical activity between treatment and control schools (Marcus et al., 2009).

Combined prevention programs. Several school-based prevention programs involve parents in prevention efforts (e.g., Blom-Hoffman, 2008; Caballero et al., 2003; Hawley, Beckman, & Thomas, 2006). In Sharma's (2006) review, 45% of reviewed interventions involved parents or included out-of-school activities. In Doak and colleague's (2006) review, approximately 50% of interventions involved the child's parents. It appears that parent involvement in prevention efforts results in effective outcomes for children. For example, Blom-Hoffman (2008) implemented a randomized, controlled universal health education program emphasizing family-school collaboration. Interactive children's books were provided to parents highlighting the importance of eating fruits and vegetables. Parents reported increased knowledge of daily fruit and vegetable requirements. However, there were no significant differences between groups

of servings of fruit and vegetables consumed daily or the availability of fruits and vegetables in the home. Childhood adiposity or obesity was not investigated.

Similarly, the *Child and Adolescent Trial for Cardiovascular Health (CATCH)* study included both classroom and family-based nutrition and physical activity components. In comparison to control classrooms, treatment classrooms had lower total fat and saturated fat content of school lunches (Osganian et al., 1996) and higher intake of total energy and proportion of energy from total fat, saturated fat, protein, and monounsaturated fat (Lytle, Stone, Nichaman, & Perry, 1996). Also, families with higher levels of participation displayed more support for physical activity and healthy food choices (Nader et al., 1996). Significant differences in the percentage of calories from fat and saturated fat in school lunches, class time devoted to *CATCH* topics, training and knowledge of *CATCH*, student energy expenditure levels, proportion of PE time in moderate-to-vigorous activity were maintained at a 5-year follow-up examination (Hoelscher et al., 2004; Hoelscher et al., 2003; McKenzie et al., 2003).

In a final example, Müller, Asbeck, Mast, Langnäse, and Grund (2001) conducted the *Kiel Obesity Prevention Study (KOPS)*, an investigation in Kiel, Germany of an obesity prevention program involving family- and school-based intervention components. The program included school-based nutrition education and three to five home visits for parent-training on monitoring food intake and activity of children, providing reinforcement, and nutrition education. More intense program components were provided for children with obesity or obese parents (e.g., structured sports program). The intervention had significant effects on tricep skinfold measurements and percentage fat mass.

Overall, systematic reviews of prevention programs for children with obesity report mixed outcomes for children, and reviews have recognized methodological limitations in the current literature base of school-based prevention programs (Boon & Clydesdale, 2005; Campbell et al., 2001; Pyle et al., 2006; Sharma, 2007; Story, 1999). Studies are lacking long-term outcomes for children and there is no standard outcome measure for childhood obesity and/or health behaviors. Also, when comparing effective interventions and ineffective interventions, Doak and colleagues (2006) found that effective interventions have a lower participation rate, suggesting that these studies are drawing from a select sample of motivated participants. Information is lacking on how these programs specifically affected those students already diagnosed with obesity (with the exception of Müller et al., 2001), and Doak et al. (2006) reports a need for interventions that directly affect the child's environment.

Treatment Programs

Although prevention programs are important in curbing the number of children who develop childhood obesity, treatment programs are necessary for addressing the needs of children already diagnosed with obesity. An effective treatment for childhood obesity should utilize the environment to identify unhealthy behaviors (e.g., overeating, sedentary behavior) and replace those with healthier alternatives (e.g., exercise and healthy eating) with the goal of reducing an energy imbalance. The overarching goal of treatment programs is for healthy behavioral habits to persist into adulthood and throughout life. Several ecological, behavioral, and social cognitive treatment strategies utilizing individuals in the child's environment to target overt, modifiable behavior have been identified to improve health behaviors associated with childhood obesity.

Family-based treatment programs. Having two obese parents is the strongest predictor of obesity in childhood (Jacobson, Torgerson, Sjöström, & Bouchard, 2006; Lake, Power, & Cole, 1997; Whitaker et al., 1997). It is clear that parents play a large role in the health behaviors of their children, and therefore, play a critical role in treating childhood obesity by improving the health behaviors of their children. Treatment programs utilize varying degrees of parental involvement and may target children and parents together or separately. For example, parents may serve as a mediator of child behavioral change by assisting in the implementation of behavior plans, be utilized as a secondary target for weight/behavior change in conjunction with their child, or provide a supportive role.

Golan et al. (1998) examined the efficacy of treatments involving the *parents only* or the *children only* as the mediator of behavioral change. Sixty obese children (6 to 11 years old; 61.6% female) were randomly assigned to one of the two treatment conditions. Both treatment groups received a similar curriculum addressing physical activity, eating habits, stimulus control, self monitoring, nutrition education, problem solving, and cognitive restructuring. The parent-only group also included information on parental modeling. After the 1-year treatment, children with parents participating as agents of change reduced their percentage overweight significantly more than the children participating in the child-only group ($p < .03$). However, both the parent-only and child-only groups lost a significant percentage of overweight ($p < .001$, $p < .01$, respectively). Additionally, the drop-out rate was significantly lower for the parent-only group ($p < .02$). At seven years follow-up, children in the parent-only group had a greater decrease in percent overweight compared with children in the children-only group ($p < 0.05$;

Golan & Crow, 2004). Results suggest that parent participation as the mediator of behavior change has added benefit for improving child weight status over treatments solely focused on the child. This provides support for an ecological systems theory based treatment program.

In a second study investigating the role of parents as agents of change, Kalavainen, Korppi, and Nuutinen (2007) compared the efficacy of a family-based group treatment program versus child-only treatment in Finland. Seventy children (7 to 9 years old; 60% female; 100% Finnish; 41.5% middle class; 54.5% high class) were stratified based on weight and height in four blocks and randomly assigned within each block to either the child-only treatment or a family-based group program. The child-only program consisted of two individual appointments for each child targeting education and physical activity. For the child-only program, booklets on weight management, healthy eating, and physical activity were provided for families. The family-centered group program consisted of 15 sessions (held separately for parents and children) promoting healthy diet, increased exercise, decreased sedentary activities, and behavioral therapy. Parents were targeted as agents of change and were responsible for child behavioral changes at home. Results indicated that children in the family-based group treatment lost more weight for height ($p = 0.001$), BMI ($p = 0.003$) and BMI-SDS (standard deviation score; $p = 0.022$). At a 6-month follow-up evaluation, effects were reduced, but participants in the family-based group program still differed significantly from the child-only participants for changes in weight for height ($p = 0.008$) and BMI ($p = 0.016$). Taken together, results from studies by Golan et al. (1998) and Kalavainen et al. (2007) indicate that treatments

involving parents as agents of change result in positive outcomes for children with obesity.

Parents and children have also been examined as mutual mediators of change (Edwards et al., 2006; Kalarchian et al., 2009; Nemet et al., 2005; Vignolo et al., 2008). In the United Kingdom, Edwards et al. (2006) investigated the acceptability and effectiveness of a family-based behavioral treatment. Thirty-three children with obesity (BMI 98th percentile for age and sex) aged 8 to 13 years (69.7% female) and their families participated in treatment sessions in an out-patient clinical setting. Pre- and post-measures were collected; however, all participants received the treatment and there were no group comparisons. The family-based behavioral treatment included two components: (a) advice on family lifestyle change to modify the environment, and (b) a behavioral modification program for the child with obesity. The first component focused on improving foods bought, stored, and served to the family, as well as travel and leisure choices. Education was provided regarding the Traffic Light diet and current activity level recommendations. Secondly, parents were educated regarding behavioral modification components including self-monitoring, goal setting, positive reinforcement, and stimulus control to support child behavior change. Children also received cognitive training to manage teasing and improve problem-solving. Following completion of the 4-month treatment program, children lost 8.4% BMI, and this was maintained at 3-month follow-up. This provides evidence that a multi-component, family-based behavior program may be effective in the treatment of childhood obesity. However, this study lacked a control group, so it is unclear if the positive outcomes were due to the treatment program or confounding variables.

A family-based behavioral intervention was also investigated by Kalarchian and colleagues (2009). They used a randomized, controlled design to examine the efficacy of a treatment package adapted from Epstein and colleagues including 20 group meetings for obese children and their caregivers (conducted separately) comprised of the Traffic Light Diet, behavioral strategies to increase physical activity while decreasing sedentary behaviors, and behavior modification techniques (i.e., self-monitoring, goal-setting, stimulus control, positive reinforcement). One hundred ninety-two children ages 8 to 12 with a BMI above the 97th percentile were randomly assigned to either a treatment or "usual care" group. Following the 6-month treatment period, children in the treatment group demonstrated significant decreases in percent overweight. This reduction was associated with higher meeting attendance, income, and reduction in caregiver BMI. For those families that attended at least 75% of meetings, decreases in percent overweight were maintained through follow-up measurements at 18 months. This indicated that those families that had higher treatment integrity were more likely to benefit from the treatment package.

Vignolo et al. (2008) also included both parents and children as mediators of change. They examined the efficacy of a cognitive-behavioral intervention for 32 children (58% female) ages 6 to 12 with obesity. Weekly outpatient treatment sessions were provided by a multidisciplinary team (i.e., pediatrician, nutritionist, psychologist, physical therapist) to participating children and their parents, sometimes together and sometimes separately. The program involved parents and family members by providing social support, modeling, and lifestyle changes. Treatment programming included cognitive-behavioral techniques (i.e., functional analysis of behavior, stimulus control,

behavior contract, reinforcement, self-control, self-monitoring, emotional education regarding internal motivation and self-esteem, assertiveness training, and problem solving), nutritional education (i.e., providing information on the Traffic Light Diet, food preparation, and eating habits), and promotion of lifestyle/ play-based physical activity. At 5-years follow-up, a significant reduction in BMI-SDS (i.e., standardized BMI) and a-BMI (i.e., adjusted BMI) was observed from baseline. Child waist circumference decreased from an average of +29.2% to +20.5% over the mean value for age and sex. Additionally, significant improvements were observed in family health habits and reduced calorie intake. However, the drop-out rate was 35.5% indicating a possible select, motivated sample, and a comparison sample was not included. Nevertheless, this study suggests the potential long-term effectiveness for family-based, multi-component treatment interventions for children with obesity.

Lastly, the evaluation of a fourth treatment program mutually involving children with obesity and their parents was conducted by Nemet and colleagues (2005). Nemet et al. (2005) also implemented a multi-component, family-based program involving dietary, physical activity, and behavioral components. After participant dropout, 24 children were randomly assigned to a treatment group (average age 10.9 years; 41.7% female; average BMI 28.5) and 22 children were randomly assigned to a control group (average age 11.3 years, 45.5% female; average BMI 27.8). The program included (a) a series of 4 evening presentations by physicians on childhood obesity, nutrition, and exercise; (b) 6 meetings with a dietician with either children, parents, or both, (depending on age of the child), and (c) 24 exercise training sessions. Participants received nutritional education (e.g., food pyramid, food choices, food labels, food preparation and cooking, eating

habits, regular meals, and controlling environments), a balanced diet, and a twice-weekly exercise training program. Results indicated that following the 3-month intervention, participants experienced significant decreases in body weight (from 63.8 kg to 61.0 kg), BMI (from 28.5 to 26.8), and skinfold thickness (from 40.2% to 36.9%). In contrast, control group participants had significant *increases* in body weight and body fat percentage, and no changes in BMI. At 1-year follow-up, significant differences were maintained between the intervention and control groups in body weight, BMI, and skinfold thickness. This study also reports the promising effects of a multi-component family-based treatment program. Although this intense program utilized children and their families, it was primarily controlled by health professionals, and access to this level of treatment is unlikely for most children with obesity and their families.

Other researchers have taken a different view at how parents may be involved in childhood obesity treatments. Rather than solely focusing on children as targets for treatment, parents are also involved as treatment targets (Epstein, Paluch, Gordy, & Ernst, 2000b). Epstein et al. (2000b) compared behavioral treatments involving parent-child problem solving, child-only problem solving, or behavioral treatment alone. Fifty-two participating children (ages 8 to 12 years old) were greater than 20% overweight, 51.9% female, and 97% Caucasian. The children were stratified by gender and degree of child and parent obesity and randomized to one of the three treatment groups. Parents and children in all groups received information about lifestyle physical activity, the Traffic Light Diet, and behavior change techniques (i.e., self-monitoring, positive reinforcement, stimulus control, and preplanning). Parent-child and child-only groups also received problem-solving training targeting parents and children, or children-only

(respectively). Results demonstrated that the group without problem solving decreased their BMI's significantly more than the other treatment groups with problem-solving ($p <$ .05). No group differences in parent weight were observed. The authors suggest that adding a problem-solving component to the treatment program may cause families to expend time and energy on problem-solving that could have been used learning healthy dietary and physical activity behaviors. This study indicates that parental involvement in treatment improves outcomes for children, but changes in parental weight outcomes has not been established.

Rather than investigating the differing roles of parents in treatments, Epstein, Paluch, Gordy, and Dorn (2000a) investigated the efficacy of various treatment components comprising family-based treatments. They compared the effectiveness of family-based behavioral treatments targeting two different health behaviors: reducing sedentary behavior or increasing physical activity. Seventy-six children (ages 8 to 12) who were 20% and 100% overweight were stratified by sex before being randomly assigned to one of four groups: low dose of decreased sedentary activity (10 hours/week), high dose of decreased sedentary activity (20 hours/week), low dose of increased physical activity (energy expenditure of 10 miles), or high dose of increased physical activity (energy expenditure of 20 miles). All groups received education on the Traffic Light Diet, positive reinforcement, and goal-setting. Parents also gave a monetary deposit that was returned based on attendance at treatment and follow up sessions. After 6-month treatment and 2-years follow up, results indicated that all approaches were associated with similar decreases in percent overweight in children ($p < .001$).

Treatments for childhood obesity may encompass a variety of behavioral strategies. To better understand which components may result in the best outcomes for children, Epstein and colleagues (2004) examined specific components that may be included in interventions. They randomly assigned 63 overweight (i.e., BMI over 85th percentile) children (8 to 12 years old) to one of two parent-implemented treatment conditions using either reinforcement or stimulus control to reduce sedentary behavior. Both groups received information on the Traffic Light Diet, exercise monitoring, and behavior modification. In addition, the reinforcement group received praise and points towards rewards for meeting goals for decreased sedentary behaviors. Alternatively, participants in the stimulus control group were positively reinforced for *recording* their sedentary behaviors, but not for behavior change. Parents whose children were assigned to the stimulus control group were also instructed to make changes in the environment to reduce the likelihood of the children engaging in unhealthy behaviors, and to establish rules regarding the sedentary behaviors. Significant decreases in percent overweight were found for children in both treatment groups ($p < .001$), and there were no significant changes between groups. Similar changes were observed across various health behaviors (i.e., reduced sedentary behaviors, $p < .05$; reduced high-calorie food intake, $p < .001$; increased physical activity, $p < .001$).

A variety of family-based behavioral treatments for children with obesity have been reviewed, including various sample sizes, sample characteristics, treatment targets, lengths of treatment, lengths of follow-up, and treatment components. All treatment programs included a combination of nutrition, exercise, and/or behavior change components and the most commonly utilized intervention components included the

Traffic Light Diet, education on exercise and/or lifestyle exercise, and behavioral modification. Common behavioral modification components included contracting, operant conditioning, stimulus control, self-monitoring, and goal-setting. In general, parents who were involved in managing the health behaviors of their children by participating in family-based, behavioral treatments had children who lost weight. This conclusion is congruent with other reviews of the literature (Berry et al., 2004; Young, Northern, Lister, Drummond, & O'Brien, 2007). Although most family-based behavioral treatments were associated with positive outcomes for children, maintenance of changes beyond treatment termination was variable. Furthermore, no studies of family-based behavioral treatments examined the integrity with which treatments were implemented by family members. Research is necessary to determine optimal treatment components and treatment length to increase maintenance of child outcomes.

School-based and combined treatment programs. Schools are a logical microsystem to provide support for students with obesity. American students ages 6 through 12 spend approximately 32 to 33 hours per week in school (Hofferth & Sandberg, 2001), and school personnel have a large amount of access to children during this time. Obesity has a significant impact on students' learning and academic progress (Datar & Sturm, 2006; Judge & Jahns, 2007). As a result, it is vital to utilize the school setting for treatment opportunities to combat childhood obesity as good health is essential for maximum cognitive, social, and psychological development. Five studies have investigated school-based treatment programs for children who are overweight or obese (Brownell & Kaye, 1982; Foster, Wadden, & Brownell, 1985; Lansky & Brownell, 1982; Lanskey & Vance, 1983; Zakus, Chin, Cooper, Makovsky, & Merrill, 1981) and three

school-based treatment programs have also involved a parental component (Brownell & Kaye, 1982; Foster, Wadden, & Brownell, 1985; Lanskey & Vance, 1983). All five identified studies of school-based treatment programs were all conducted over 20 years ago. As a result, there appears to be a paucity of updated research on school-based treatment studies. However, results of these studies indicate that school-based programs may be beneficial for the treatment of childhood obesity, particularly those involving behavior modification, education, and exercise. Four studies examined the efficacy of a school-based treatment program in comparison to a control group (Brownell & Kaye, 1982; Foster et al., 1985; Lanskey & Vance, 1983; Zakus et al., 1981). All treatment programs included a combination of nutrition, exercise, and behavior modification components and were conducted during school, after school, or both. Common behavioral strategies included contracting, reinforcement, stimulus control, self-monitoring, and/or goal setting. Furthermore, all school-based studies presented treatment programs to groups of children (e.g., in a class format), rather than individualized programs.

The interpretability of studies on school-based treatment programs is limited, as all studies were conducted over 20 years ago. It is unclear why there are no current research studies investigating school-based treatments for childhood obesity. The majority of current school-based research is examining prevention efforts targeting all schoolchildren, rather than treatment efforts targeting children that are already overweight. This may be due to the perception of possible stigmatization of children participating in programs to reduce weight, particularly in the presence of peers at school.

More recent studies are necessary to determine if schools are an effective vehicle for long-term behavior and weight changes in youth.

Overview and Gaps in the Literature

Prevention and treatment programs for childhood obesity utilizing behavioral, social-cognitive, and ecological systems theories play a crucial role in curbing the rising prevalence of childhood obesity and promoting health behavior change in children. Individuals in the home and school settings have been identified as important intermediaries for change. However, these influential environments, particularly the school environment, remain underutilized. Most effective interventions for childhood obesity are multifaceted, including nutrition, exercise, and behavioral modification components and family involvement has been identified as an important mechanism for the success of children.

Studies evaluating school-based prevention programs are on the rise. Results from these studies are hopeful; however, most studies contain multiple methodological limitations including lack of long-term investigations, no standard outcome measure across studies, and select samples. Few documented family-based prevention programs exist, so interpretations of their effectiveness is inconclusive, and most family-based prevention programs are limited to a specific population of African American girls, thereby limiting generalizability. Furthermore, implementing prevention programs alone is likely to be insufficient.

Most current research on prevention programs has not examined how these programs specifically impact those students already diagnosed with obesity (with the exception of Müller et al., 2001). As the epidemic of childhood obesity continues to be

publicized, and our communities are made increasingly aware of childhood obesity as a public health crisis, research on prevention programs has expanded. Prevention efforts are necessary to provide healthy lifestyle education reaching a wide range of children and to decrease the amount of children needing intense, individualized treatments. However, treatment programs remain important to those children not responding to universal prevention programs, and current research on treatment efforts, particularly in the schools, remains lacking. A greater awareness of the stigma attached to participation in school-based obesity treatments may have decreased motivation to investigate treatment programs for childhood obesity. However, failing to provide treatment for children with evidenced need may be comparable to withholding treatment for children with learning disabilities due to fear of stigmatization. More research is necessary to better understand how to improve the health behaviors and weight status of children currently suffering from overweight or obesity utilizing the school environment.

Initial reviews of treatment programs targeting childhood obesity are positive. Evaluated treatment programs have included various program components (e.g., dietary, physical activity, education, behavior modification) targeting multiple classes of behaviors (e.g., exercise, sedentary behavior, dietary intake). The majority of treatment programs for obese children involving ecological systems target the family. In general, it appears that treatment programs involving families or caregivers in the treatment of their children's weight management were successful in helping children lose weight. As a result, the family appears to be an essential element in weight management programs for children with obesity. However, maintenance of weight changes for beyond termination of family-based programs was variable and should be investigated further. There appears

to be no *current* studies examining school-based treatments for children with obesity. As a result, the interpretability of school-based treatment programs is limited. Current school-based research examines prevention efforts targeting all schoolchildren, rather than treatment efforts targeting children that are already overweight. More recent studies are necessary to determine if schools may be an effective environment for the implementation of behavioral treatment programs for children with obesity.

Only three studies have investigated treatments capitalizing on both the school and home environments. Those studies that have included both a home and school component have primarily involved parents in an educational role only. In other words, there have been no programs encouraging conjoint, collaborative treatment programs (i.e., mesosystemic treatments) capitalizing on the interaction between the child's parents and school personnel. More research is necessary to better understand the value of the school setting, and how the school environment may partner with the home setting to further enhance outcomes for children. Treatments for childhood obesity likely require a multifaceted, coordinated effort.

Lastly, all of the reviewed studies have included individuals in the obese child's environment to participate in and implement behavioral treatments. However, no studies have examined treatment integrity, or the degree to which the parents and/or school personnel implemented the treatment as it was designed. Child outcomes are likely affected by the integrity of the treatment implementation. More research is necessary to document the implementation of the treatment by individuals in the child's environment, and to investigate strategies to improve treatment fidelity.

Conjoint Behavioral Consultation

Definition and Conceptualization

Conjoint Behavioral Consultation (CBC) is defined as, "a structured, indirect form of service-delivery, in which parents and teachers are joined to work together to address the academic, social, or behavioral needs of an individual for whom both parties bear some responsibility" (Sheridan & Kratochwill, 1992, p. 122). Through CBC, a child's parents and teacher are brought together with a consultant to problem-solve the child's concerns across home and school settings. The three overarching objectives of CBC are to (a) promote outcomes for children through collaborative, cross-system planning, (b) support parent engagement, and (c) establish and strengthen home-school partnerships (Sheridan & Kratochwill, 2008).

Conjoint Behavioral Consultation has it's foundation in ecological systems and behavioral theories and directly influences the child's *micro* and *mesosystems*. The child's primary caregivers (i.e., teacher and parents) collaborate and regularly communicate to promote appropriate, healthy child behaviors. Furthermore, CBC promotes behavioral change by evaluating environmental factors influencing the maintenance of unhealthy behavior patterns and promoting behavioral change based on parents and teacher's response to child behavior.

Procedures and Components

Conjoint Behavioral Consultation is conducted through a series of collaborative meetings joining families and schools to (a) identify specific patterns and environmental conditions that influence the child's behaviors; (b) develop feasible, acceptable plans to promote desirable behaviors; (c) implement specific, individualized behavioral change strategies across home and school environments; and (d) evaluate outcomes.

Specifically, CBC consists of four stages involving approximately three structured interviews, (a) conjoint needs identification interview, (b) conjoint needs analysis interview, (c) plan implementation, and (d) conjoint plan evaluation interview (Sheridan & Kratochwill, 2008).

Empirical Evidence

Previous and ongoing studies demonstrate the efficacy of CBC. CBC is an effective service-delivery model superior to other forms of service delivery including teacher-only consultation (Sheridan et al., 1990) and parent training manuals (Galloway & Sheridan, 1994). CBC has previously been effectively implemented for academic, behavioral, and social concerns across home and school environments (Colton & Sheridan, 1998; Galloway & Sheridan, 1994; Gortmaker, Warnes, & Sheridan, 2004; Sheridan, Eagle, Cowan, & Mickelson, 2001; Weiner, Sheridan, & Jenson, 1998). For example, within a small n design Colton and Sheridan (1998) reported that CBC improved social skills in three boys with Attention Deficit/Hyperactivity Disorder. Implementation of CBC also increased math completion and accuracy of six elementary school students (Galloway & Sheridan, 1994). Likewise, Weiner and colleagues (1998) found that a treatment program implemented in the context of CBC improved homework completion and accuracy for 4 out of 5 middle school students. In a large-scale review of CBC outcomes for 4 years of federally funded CBC training project for graduate students, Sheridan and colleagues (2001) indicated favorable effects at home (effect size average 1.08; SD = .82) and school (effect size average 1.11; SD = 1.24) for 52 students with disabilities or at-risk for qualifying for special education services. Also, goal

attainment reports indicated that 100% of parents and 94% of teachers rated consultation goals as partially or fully met following CBC.

The acceptability and satisfaction of parents, teachers, and children participating in the CBC process has also been investigated. A national sample of 490 practicing school psychologists reported CBC to be an acceptable model of service delivery (Sheridan & Steck, 1995). Furthermore, school psychologists rated CBC as more acceptable than other service-delivery models (i.e., direct service, teacher-only consultation, parent-only consultation) for all types of concerns. Freer and Watson (1999) compared acceptability ratings by 11 parents and 61 teachers involved in teacher-only consultation, parent-only consultation, and CBC. CBC was rated as the most acceptable form of consultation for various concerns by parents and teachers.

Although CBC has been found to be an effective, acceptable service delivery model for academic, behavioral, and social concerns, only one study has investigated how CBC may also be beneficial to addressing the health-related behavioral needs of children. Lasecki, Olympia, Clark, Jenson, and Heathfield (2008) applied a behavioral intervention to reduce blood glucose levels in four children with Type I Diabetes. Participants were randomly assigned to service-delivery within a parent-only behavioral consultation or CBC model. Significant reductions in hyperglycemia were observed in all four children receiving the behavioral interventions in the context of parent-only behavioral consultation and CBC to more appropriate blood sugar levels. Additionally, target behaviors related to blood glucose management (e.g., consistent insulin injections, after school snacking, monitoring blood glucose levels) were significantly improved for all participants. Greater gains for blood sugar levels and target behaviors as well as

higher acceptability ratings were observed for participants in the CBC group than in the parent-only behavioral consultation groups. However, these results are preliminary and should be interpreted with caution, as they are limited to a small number of participants. Although initial research on the application of CBC to health behaviors is promising, current research is limited to one study on one health-related behavior. More research is necessary to determine how this highly successful and acceptable model of service-delivery can be further expanded to address the physical needs of children, including health behaviors related to overweight and obesity in children.

Summary and Purpose of the Study

Children with obesity experience a plethora of adverse physical, psycho-social, and academic effects that perpetuate into lifelong consequences. These children experience numerous comorbid physical conditions, such as orthopedic abnormalities, gallstones, hepatitis, sleep apnea, intracranial hypertension, asthma, insulin resistance, liver disease, and menstrual abnormalities. They encounter bullying, stigmatization, and poor social and academic achievement. Furthermore, the prevalence of obesity in childhood has reached unprecedented rates and continues to climb. Interventions to stop the continuation of unhealthy behavioral patterns resulting in obesity in children are critical.

Treatments that meaningfully involve individuals in the child's microsystems (i.e., parents and school personnel) in behavioral treatments for children with obesity result in improved outcomes for children. However, few studies have implemented *treatment* programs within the schools as recent efforts have been limited to school-wide preventative programs. Although these prevention programs are important and beneficial

to participants, they are insufficient for the treatment of students already suffering from obesity. Additionally, relatively few studies have *mutually* involved both parents and school personnel in treatments. When parents and teachers collaborate to improve the health of children, it is likely that effects will be greater than treatments targeting one environment alone (Lasecki et al., 2008). Thus, there is a greater need for research involving families *and* schools.

Conjoint Behavioral Consultation is an indirect form of service delivery involving the joining of multiple systems to address significant concerns in children's lives. As a result, CBC provides an ideal model for delivering comprehensive treatment strategies to improve the health behaviors of children with obesity. The effectiveness and acceptability of CBC as a service-delivery model have been well-documented. Only one study has investigated the efficacy of CBC for health-related behavioral concerns (i.e., monitoring of blood glucose levels; Lasecki et al., 2008), and no studies have implemented CBC for populations of children with obesity. Therefore, the purpose of the current study is to address gaps in the literature by examining the efficacy of CBC as a service-delivery model to implement a collaborative (i.e., home and school) health behavior intervention for children with obesity.

The purpose of this study is to evaluate the efficacy of CBC in improving child health behaviors and health status. Specific research questions are: Is CBC effective for (a) increasing healthy dietary and physical activity behaviors of children with obesity? and (b) improving the health status of children with obesity? Dietary and physical activity behaviors were assessed using the Physical Activity Questionnaire for Children (Crocker et al., 1997), the Daily Food Report, and direct behavioral observations by

parents, school personnel, and the CBC consultant. Each child's health status was assessed bi-weekly by measuring height and weight to calculate BMI. It was hypothesized that CBC would be effective for increasing the dietary and physical activity behaviors of children with obesity as well as improving their BMI percentile.

CHAPTER 2

METHODS

Setting

All research activities were completed in the Midwestern communities of DeWitt and Lincoln, Nebraska. Lincoln is a medium-sized city and DeWitt is a small, rural community approximately 45 miles from Lincoln. The participants' schools included a public elementary school and middle school in the Lincoln Public School district, a parochial elementary school in Lincoln, Nebraska, and a consolidated public elementary school in DeWitt, Nebraska. Child participants and their families were recruited from referring pediatricians and/or nurses at Complete Children's Health (CCH), a group pediatric practice with 3 locations in Lincoln, Nebraska. The principal investigator conducted all conjoint behavioral consultation interviews with families and school personnel at the schools where the child participants attended. Intervention procedures and behavioral observations were implemented in both home and school settings.

Participants

Selection Criteria

Four children with obesity in Lincoln and DeWitt, Nebraska served as participants. Each child was referred for participation in this program by his or her physician or nurse based on BMI scores calculated from regular height and weight screenings. Following agreement to participate, an updated BMI assessment was conducted. *Inclusionary criteria* for child participants were the following:

1. Child participants met the definition for obesity. A child was considered obese, and therefore eligible for participation, if she had a Body Mass Index (BMI; weight in

kilograms divided by height in meters squared) at or above the 95th percentile when adjusted for age and sex based on national statistics (Kuczmarski, Kuczmarski, & Roche, 2002; Ogden et al., 2002).

2. Child participants were ages 7 to 12 years old and attended an elementary school in Lincoln, Nebraska or surrounding communities.
3. The families and school personnel of child participants provided voluntary, informed consent for their participation and their child's participation in the study.
4. Child participants provided voluntary, informed assent for their participation in the study.
5. English was the primary language spoken by both child participants and their families.
6. Written permission was obtained from each participating child's pediatrician prior to her participation in the study.

Exclusion criteria for child participants were the following:

1. Each child's pediatrician verified that child participants did not have a serious non-obesity related physical illness (e.g., cancer, thyroid disorder) that would be likely to influence physical activity, feeding, or weight which could preclude participation in assessment or intervention activities.

2. Participants did not have a serious psychiatric disorder (e.g. schizophrenia) or intellectual disorder that could preclude participation in assessment or intervention activities.

Child Participant Information

Four children with obesity ages 7 through 11 were recruited to participate. Participating children were limited by age and language spoken in the home to limit

confounding variables within a restricted sample size for this study. See Table 1 for demographic information for each child participant. Pseudo initials are used to represent each child participant. Pertinent narrative information about each child's background is also noted below.

Table 1

Child Participants' Demographic Information

Participant	Gender	Grade	Age at start of project	Ethnicity	School
BR	F	3	8	White	Consolidated Public Elementary School
YB	F	2	7	Latina	Parochial Elementary School
AN	F	6	11	White	Public Middle School
TO	F	3	9	White	Public Elementary School

BR. BR lived with her biological parents and younger brother. Her mother worked in the home caring for BR and her brother, and her father worked out of the home. Prior to the study, BR was diagnosed with ADHD Combined Type by a licensed psychologist. BR and her mother regularly visited a pediatric psychologist to address behaviors related to ADHD and BR was prescribed atomoxetine (25 mg) by her physician. Common side effects of atomoxetine may include loss of appetite, sleep

problems, nervousness, irritability, or nausea; however, BR's mother reported observing no medication side effects. BR's mother reported a history of poor nutritional choices and reduced physical activity at home. A review of her medical record revealed that BR's weight had been above the 95th percentile for her age and sex since age 2.

YB. YB's parents reported that she was conceived through in vitro fertilization. She lived with her biological parents and had no siblings. YB's mother worked part time and her father was not working due to a back injury and was receiving disability compensation. During the course of this study, YB's family moved into a new home. Prior to the study, YB was diagnosed with ADHD Combined Type by her physician and was prescribed methylphenidate (36 mg), and YB and her parents regularly visited a psychologist to address behaviors related to ADHD. Common side effects of methylphenidate include loss of appetite, nervousness, nausea, sleep problems, and headaches. YB's parents noted that YB had difficulty sleeping and YB was also prescribed melotinin by her physician to help her sleep at night. YB's parents also reported some loss of appetite while taking methylphenidate and reported that YB often binged on snacks after her methylphenidate wore off in the evenings. A review of her medical record revealed that YB's weight had been above the 95th percentile for her age and sex since age 4.

AN. AN was the only middle school child participant in this study. AN's biological parents were divorced, and she lived with her biological father, her father's girlfriend, her younger brother, and younger half-sister. AN's biological mother lived with AN's paternal grandmother. AN's mother visited AN's home each night to cook and eat dinner with AN and her family. AN's biological mother worked full time and her

father was enrolled in college courses to earn a business degree. AN's mother and father reported a history of oppositional behavior by AN. A review of AN's medical record revealed that AN had been diagnosed with asthma and prescribed Albuterol as needed. Additionally, AN's BMI had been above the 95th percentile for her age and sex prior to age 8.

TO. TO lived with her biological mother and younger brother and had no contact with her biological father. TO's mother worked full time as an administrative assistant. Although TO's mother and brother were not overweight, TO's mother reported a paternal family history of obesity. TO's mother reported that TO visited her grandparents approximately 3 times per week and shared that they TO's grandparents provided unlimited access to sugary foods and beverages. A review of TO's medical record revealed that TO had been diagnosed with allergies prior to the study and was prescribed Flonase (as needed), Ventolin (as needed), and Zyrtec. None of these medications have been shown to affect appetite or weight. Further, TO's BMI had been above the 95th percentile for age and sex prior to age 6.

Parent, School Personnel, and Consultant Information

Six family members participated in a series of four consultation interviews with the consultant. All participating family members were biological parents. BR and TO's mothers were involved in the CBC interviews and both parents (i.e., father and mother) were involved in CBC interviews for YB and AN. Five parents were White and one was Latino (i.e., YB's father), and all parents were between the ages of 25 to 40. Three participating parents were married (i.e., parents of BR and YB) and three parents were divorced and single (i.e., parents of AN and TO).

Seven school personnel participated in the consultation interviews with the consultant and parents. The school staff member participating in the study varied depending on the specific needs of each participating child and the role of the school personnel in the school building. School personnel actively participating in the consultation interviews for BR, AN, and TO were the school counselor, classroom teacher, and school nurse, respectively. The school principal also participated in the first two interviews for BR. For YB, a classroom teacher participated for the first three consultation interviews; however, was unable to attend the fourth interview due to maternity leave. As a result, the school lunch/recess monitor and P.E. teacher participated in the fourth interview. All school personnel participating in interviews were female and White, with the exception of a male principal who attended two of the interviews for BR. Supplemental school staff members were used to support data collection and plan implementation, including P.E. teachers, lunch/recess monitors, and classroom teachers. In addition, school nurses and one P.E. teacher collected bi-weekly height and weight measures to monitor BMI for each participating child.

The CBC consultant was a 27 year-old, White female and is the primary investigator of this study. She received her Master's degree in Educational Psychology from the University of Nebraska-Lincoln and was an advanced graduate student in the School Psychology Program with a leadership specialization in Family-Centered Interdisciplinary Collaboration at the University of Nebraska-Lincoln. The consultant coordinated recruitment of schools and participants, conducted interviews with school personnel and families of each participant, trained school personnel and families to

implement intervention components, and monitored accuracy of treatment implementation.

Independent and Dependent Variables

The primary independent variable in this study was a multi-component child health behavior intervention including three standard, evidence-based components individualized to meet child, family, and school needs: (a) education for participating children, families, and school personnel; (b) behavior modification (i.e., stimulus control, goal-setting, reinforcement for behavior change); and (c) home-school communication. These procedures were chosen based on previous evidence of their efficacy for behavior change (e.g., Galloway & Sheridan, 1994; Jurbergs, Palcic, & Kelley, 2007; Sabin et al., 2007; Speroni et al., 2008; Stolley & Fitzgibbon, 1997), and the routine use of education and behavior modification with this population (e.g., Berry et al., 2004; Shaya, Flores, Gbarayor, & Wang, 2008). However, these three components had previously not been utilized in conjunction and home-school communication had not been used to improve health behaviors of children with obesity. Furthermore, these components were uniquely applied in this study as they were implemented in the context of conjoint behavioral consultation to utilize and join the environments in which the child is rooted. The intervention was implemented for two behaviors (i.e., dietary and physical activity behaviors) for each child in a staggered, multiple-baseline fashion.

The primary dependent variables for this study were dietary and physical activity behaviors and body mass index. Dietary behaviors were behaviors related to consuming foods/beverages or patterns of eating/drinking and physical activity behaviors were behaviors that involved movement of the body to use energy. The primary measure of

dietary and physical activity behaviors was direct observations of individualized, prioritized target health behaviors within the school and home settings by family and school personnel. Examples of individualized target dietary and physical activity behaviors include vegetable intake, biking/walking, or participation in P.E. Refer to tables 3 and 5 for operationally-defined behaviors chosen for each child and measurement procedures individualized for each child/health behavior. Broad patterns of dietary and physical activity behaviors were measured by the Daily Food Report and the Physical Activity Questionnaire for Children, respectively. Body mass indices were calculated from height and weight measures to examine overall health changes. More information regarding measurement of dependent variables is provided on pages 82-90.

Procedures

Conjoint Behavioral Consultation for Health Behaviors

Conjoint behavioral consultation (CBC; Sheridan & Kratochwill, 2008) was used to implement this treatment program. The original CBC procedures developed by Sheridan and Kratochwill (2008) were slightly modified to adapt to the research design. The CBC process for health behaviors consisted of a series of six stages including four collaborative interviews. The stages were (a) Conjoint Needs Identification Interview (CNII), (b) Conjoint Needs Analysis Interview (CNAI), (c) treatment implementation, (d) Conjoint Plan Evaluation Interview 1 (CPEI1), (e) treatment implementation, and (f) Conjoint Plan Evaluation Interview 2 (CPEI2; see Table 2 for a detailed review of each stage). The specific consultation procedures were adapted to meet the individual needs of children, families, and school personnel. The CBC consultant conducted 45 minute

school-based joint interviews with families and school personnel of each participating child. See Appendix A for CBC forms for each interview.

Table 2

Stages of CBC for Health Behaviors

Conjoint Needs Identification Interview (Week 1) • Identify strengths of the child, family, and school personnel • Identify and prioritize individually relevant health behaviors, one addressing dietary behaviors and one targeting physical activity behaviors • Share background and relevant information (e.g., family mealtime patterns, cultural customs, medical history) • Determine general long-term goals for behavior change (e.g., increase physical activity; increase intake of high nutrient, low energy dense foods) • Clarify specific settings/times that will be targeted for intervention (e.g., breakfast time, lunch time, recess) • Establish baseline data collection methods for each health behavior as relevant to behavior targeted per child (e.g., teacher and/or parent observation of beverage servings, direct measurement of number of steps taken daily)
Conjoint Needs Analysis Interview (Week 2) • Discuss observations and interpretations of baseline information • Determine short-term goals for behavior change related to specific target behaviors based on baseline data collection (e.g., increase number of steps taken daily by 25%) • Identify environmental variables that may be impacting the target behaviors (e.g., large amount of sugary foods in the house, new videogame system, easy access to inexpensive low-nutrient foods in the school cafeteria) and investigate trends across home and school • Design a multi-component plan to address the first target behavior (e.g., dietary behavior) involving 3 standard, evidence-based components individualized to meet child, family, and school needs: (1) education for participating children, families, and school personnel; (2) behavior modification; and (3) home-school communication
Treatment Implementation (Week 2-8)

- Families and teachers implement the intervention plan with the child at home and school
- CBC consultant conducts education and training, engages in coaching to ensure understanding of the plan (i.e., offers assistance, reinforces families' and teachers' efforts, monitors accuracy of intervention implementation, assesses child's initial response to the intervention, and determines the need for immediate plan modifications)
- CBC consultant may visit the home and/or school to model the plan and provide coaching and feedback to the child's families and/or school personnel regarding plan implementation

Plan Evaluation Interview 1 (Week 5)

- Evaluate the child's progress in relation to baseline information
- Determine if goals have been attained on the first behavior (e.g., dietary behavior)
- Determine if plan should be continued, modified, or terminated
- Add individualized plan components (e.g., physical education, self-monitoring, and sticker chart reward system) to target the secondary health behavior (e.g., physical activity behavior)

Treatment Implementation (Week 5-8)

- Families and teachers implement the complete intervention plan across home and school
- CBC consultant provides consistent support and coaching
- CBC consultant visits the home and/or school to model the plan and provide coaching and feedback to the child's families and/or school personnel regarding plan implementation

Plan Evaluation Interview 2 (Week 8)

- Evaluate the child's progress in relation to baseline information for both dietary and physical activity behaviors
- Determine if goals have been attained for both dietary and physical activity behaviors
- Determine if the plan should be continued, modified, or terminated

The specific CBC procedures were individualized for the strengths and concerns of each participating child and her family. The following is a brief overview of the

standard CBC process and procedures for each interview as well as the specific interview proceedings for each unique participant.

Conjoint needs identification interview. Following an explanation of CBC procedures to participants, collection of consent forms, and gathering of initial background information, a CNII was held. At the CNII, interview participants shared information regarding the child's strengths and concerns and identified and prioritized individually relevant settings and health behaviors, one addressing dietary behaviors and one targeting physical activity behaviors. See Table 3 for a list of target behaviors for each participant. Following the CNII, family and school participants collected data at home and school for approximately one week until the Conjoint Needs Analysis Interview (CNAI). Data collection was individualized for each participant and specified target behavior.

BR. BR's mother, school counselor, and school principal attended the CNII. BR's counselor and teacher reported that BR had many strengths, including playing chess, drawing, riding her bike, and participating in preferred physical activities. BR's mother noted concerns related to poor nutritional choices, including consuming high amounts of sweets and snacks and few vegetables. She also reported a high level of sedentary activity (e.g., playing video and computer games) and that BR needed more exercise. Target behaviors chosen for home were *vegetable intake* and *walking/biking*. Her counselor reported lack of active participation in P.E. class and noted that BR often made excuses to avoid participation in activities that she did not enjoy. She also reported that BR consumed an unbalanced diet at lunch and did not eat a wide variety of foods.

The target behaviors chosen for school were *participation in P.E. class* and *vegetable intake*.

YB. YB's parents and classroom teacher participated in the CNII. Her classroom teacher and parents reported that YB displayed many strengths, including cooking, swimming, playing outside, dancing, 4-wheeling, Girl Scouts, reading, drawing, playing with a hula hoop, helping her dad work on the car, and playing nicely with friends. They also reported concerns related to YB's health. At home, YB's parents noted concerns related to frequently consuming unhealthy snacks. They also shared that although YB frequently played outside, she may benefit from increased physical activity. As a result, the target behaviors chosen for home were *snacking* and *moderate to vigorous activity*. Her teacher reported that YB rarely chose physically active choices during recess time; rather, YB sat and talked with her friends at recess. Further, her teacher shared that YB primarily ate starches (e.g., potatoes, bread) and meat at lunch and rarely ate fruit and vegetable selections. The target behaviors identified for school were *fruit and vegetable intake* and *participation in recess*.

AN. The consultees attending the CNII for AN were AN's mother, father, and her teacher for Math and Social Studies classes. They reported strengths of AN were Girl Scouts, helping with her younger sister, achievement in Math class, playing football and baseball, participating in the Green Team after school club, biking, and playing Wii. Concerns at home were reported to be eating quickly and sneaking foods (e.g., sugary snacks, soda pop) out of the kitchen cabinets without parental permission, consuming them in her room, and hiding the wrappers. Her parents also reported that AN rarely engaged in physical activity and she refused to go to the gym with her mother. The target

behaviors chosen for home were *snacking* and *moderate to vigorous physical activity*. At school, AN's teacher reported that she did not eat a balanced lunch and consumed a high number of sweet and salty foods. In addition, AN's P.E. teacher shared that AN rarely participated in P.E. class; instead, AN asked to go to the nurse's office because she felt ill or sat on the sideline. Thus, the target behaviors identified for AN at school were *intake of fats/oils/sweets* and *participation in P.E. class*.

TO. Participants in the CNII for TO were her mother and the school nurse. They reported that TO's strengths were Girl Scouts, her kindness, reading, swimming, playing sports, and walking. TO's mother reported that she spent a lot of time outside, but usually just stood around and talked to her friends. She also shared that TO often consumed unhealthy snacks after school and before bed. Her mother reported that TO's grandparents often gave her ice cream and candy. Target behaviors at home were chosen as *snacking* and *moderate to vigorous physical activity*. TO's school nurse reported that TO visited the nurse's office frequently during the school day and rarely had an observable illness or injury. She shared that TO's teacher had reported that TO had brought unhealthy snacks (e.g., candy, soda pop) to school in her backpack and consumed them during the school day. She also shared that TO participated in P.E. class, but chose inactive options during recess such as standing and observing the playground or talking to a peer or teacher. The target behaviors chosen for school were *sneaking snacks* and *participation in recess*.

Table 3

Target Behaviors

Child	Home		School	
	Dietary Behavior	Physical Activity Behavior	Dietary Behavior	Physical Activity Behavior
BR	Vegetable intake: Vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other cooked or raw vegetables, 0.75 cup vegetable juice) consumed by BR daily.	Biking/walking: The number of minutes BR spends moving forward while sitting or standing on her bike (i.e., feet are off the ground and moving the pedals) or walking (i.e., one foot placed in front of the other) outside.	Vegetable intake: Vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other cooked or raw vegetables, 0.75 cup vegetable juice) consumed by BR daily.	Participating in P.E.: During P.E. class, BR is engaged in moderate to vigorous activity (e.g., playing basketball, running, jumping, throwing).
YB	Snacking: Foods consumed by YB outside of scheduled meal times daily	Moderate to vigorous activity: YB is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed.	Fruit and vegetable intake: Fruit (i.e., 1 medium piece of fruit, ½ cup berries or diced fruit, ¼ cup dried fruit) and vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup cooked or raw vegetables, 0.75 cup vegetable juice) consumed daily.	Participating in recess: During recess, YB is engaged in moderate to vigorous activity (e.g., hula hoop, running, jump rope).

AN	Sneaking snacks: Foods consumed by AN outside of scheduled meal times without previous permission from her parents daily.	Moderate to vigorous activity: AN is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed.	Fats/oils/sweets intake: Servings of fats/oils/sweets (e.g., butter, fried foods, gravy, salad dressing, candy, sweet desserts, soda pop) consumed by AN daily.	Participating in P.E. class: During P.E. class, AN is engaged in moderate to vigorous activity (e.g., playing basketball, running, kicking).
TO	Snacking: Food consumed by TO outside of scheduled meal times daily.	Moderate to vigorous activity: TO is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed.	Sneaking snacks: Foods or food wrappers found hidden in TO's possessions (e.g., backback, desk) at school.	Participating in recess: During recess, TO is engaged in moderate to vigorous activity (e.g., running, jumping, skipping).

Conjoint needs analysis interview. Participants in the CNAI were the consultant, parent(s), participating school personnel, and the child. The interview participants collaboratively determined which behavior to target first (i.e., the prioritized dietary or physical activity behavior) based on the individualized needs and goals of each child and his or her family and school personnel. All interview participants identified specific patterns and environmental conditions that influenced the child's prioritized behaviors. A reasonable, acceptable intervention plan was established at the CNAI to improve one prioritized health behavior. The participating child was invited to participate in plan development to enhance ownership of the intervention and motivation

for change. All treatments utilized evidence-based techniques, including 3 standard strategies: (a) education for participating children, families, and school personnel; (b) behavior modification, which included stimulus control, goal-setting, and reinforcement/motivational strategies for child behavior change; and (c) home-school communication. Unique tactics comprising each plan varied based on the unique strengths and needs of each participant (e.g., reinforcement schedule, reward system). The intervention plan was implemented following the CNAI interview with the support of the CBC consultant (i.e., treatment implementation phase).

BR. The participants at the CNAI for BR were BR's mother, the school counselor, the school principal, and BR. BR's mother and the school counselor shared information collected regarding target behaviors at home and school. The team decided to develop a plan to address the physical activity behaviors, *biking/walking* and *participation in P.E. class* first due to the more severe nature of these concerns. Challenging, yet attainable goals were set for increased amounts of physical activity at home and school based on baseline data. The team then discussed contributing factors to physical activity concerns. BR's mother reported BR displayed increased physical activity when engaging in a preferred activity, when her mother didn't drive her around town, or when the family went for walks together. She reported that BR had reduced physical activity when she had a lot of homework. BR's counselor reported that BR avoided less preferred, uncomfortable activities during P.E. class and became frustrated when she was not successful at completing activities. As a result, the team decided the primary function of BR's reduced physical activity was escape from unpleasant and uncomfortable physical demands and lack of motivation to engage in less preferred activities. An individualized

plan was developed by all meeting participants to address hypothesized function of the target behaviors to increase BR's biking/walking at home and participation in P.E. at school.

YB. The participants in the CNAI for YB were YB's mother and father, YB's classroom teacher, the CBC consultant, and YB. YB's parents and teacher shared information collected regarding the target behaviors at home and school. The team decided to first develop a plan to address the dietary behaviors, snacking and fruit/vegetable intake, due to the more problematic nature of the dietary concern at home. Based on baseline data, goals were set for appropriate amounts and types of snacking at home and number of servings of fruits and vegetables eaten at school. The team also discussed contributing environmental factors to dietary concerns. At home, YB's parents reported that YB engaged in less snacking if she was distracted with alternative activities, such as playing outside or on the computer or if they ate a later dinner. In addition, they reported that YB had unlimited access to food and that there were few healthy snack food options in the home, particularly if they had not visited the grocery store recently. At school, YB reported that she did not like the taste of vegetables and preferred foods like potato chips, pizza, or chicken nuggets. YB's teacher reported no consequences for YB not eating her fruits and vegetables at school. As a result, the team decided that the primary function of YB's snacking at home was limited availability of healthy food options and boredom. At school, it was determined that the primary function of reduced fruit and vegetable intake was low motivation for consuming less preferred food items. An individualized plan was developed by all meeting participants to address the

hypothesized functions of the target behaviors to decrease YB's snacking at home and increase consumption of fruit and vegetables at school.

AN. The participants in the CNAI for AN were AN's biological mother, biological father, AN's Math and Social Studies teacher, the CBC consultant, and AN. AN's father and teacher shared information collected regarding the target behaviors at home and school. The team decided to develop a plan to address the physical activity behaviors, *moderate to vigorous activity* and *participating in P.E. class*, first due to the severity of these problem behaviors. The team set goals for increased amounts of physical activity at home and school. Factors contributing to physical activity target concerns were then identified. At home, AN's parents reported that AN's physical activity was increased when friends in her neighborhood are home and the weather was pleasant. However, they reported that AN preferred to stand and talk with her peers than engage in activity. At school, AN's teacher shared observations from AN's P.E. teacher who reported that AN would only engage in preferred activities (e.g., hockey and football), often went to the nurse or to the restroom to avoid activities that were difficult or may have resulted in peer attention, and preferred to stand and converse with her friends. AN's P.E. teacher reported that he allowed AN to go to the nurse or the restroom and provided no consequences for AN's absences from class activities. As a result, the team concluded that the primary function of AN's reduced moderate to vigorous activity at home was lack of motivation. At school, it was determined that the primary function of reduced participation in P.E. class was avoidance of peer attention and less preferred activities. An individualized plan was developed by all meeting participants to address

the hypothesized functions of the target behaviors to increase AN's physical activity at home and school.

TO. Participating individuals at the CNAI for TO were TO's mother, the school nurse, the CBC consultant, and TO. TO's mother and school nurse reported information collected regarding the dietary and physical activity target behaviors. The team decided to develop a plan to address dietary behaviors at home and school first. They set goals for appropriate amounts and types of snacks at home and number of snacks hidden at school. The team also reported environmental conditions that may have affected the chosen target behaviors. In regards to snacking at home, TO's mother reported that TO consumed fewer snacks when the family was busy or if their family got home from work/school late and she did not have time to snack. Also, she reported that TO ate more unhealthy snacks when they were readily available in the home. The school nurse reported that she was unsure of conditions contributing to sneaking snacks at school because she was unable to observe TO's behavior directly. She speculated that TO was bringing snacks from home or from the after school program and received attention from her peers and the teacher for having snacks at school. As a result, it was hypothesized that the function of TO's snacking behavior at home was automatic reinforcement, boredom, and limited availability of healthy snacking options in the home. At school, the function of TO's snacking was hypothesized to be automatic reinforcement and teacher attention. A plan was developed by all meeting participants to address the hypothesized functions of the target behaviors to decrease TO's unhealthy snacking at home and school.

Conjoint plan evaluation interviews. The CPEI 1 was held approximately 3 weeks following the CNAI to evaluate and modify the plan, as needed, and add additional plan components to address a second target behavior. The updated intervention plan, including components to address both target behaviors, was implemented following the CPEI 1 (i.e., treatment implementation phase). The CPEI 2 was held approximately 3 weeks following the first CPEI. At this meeting, the effectiveness of the complete plan was evaluated and modifications were made as necessary. The length of the entire CBC process ranged from approximately 6 to 8 weeks.

BR. Participants at the CPEI 1 were BR's mother, BR's school counselor, the CBC consultant, and BR. BR's mother and school counselor reported information collected regarding both target behaviors at home and school. The team reviewed the plan for physical activity behaviors. BR's mother reported that BR had met her biking/walking goal most days at home and that she was responding well to rewards at home. At school, the school counselor reported that BR met her goal most days, but struggled with activities that were more physically difficult, such as gymnastics. However, she seemed to respond well to rewards and immediate feedback. The team decided to continue the plan as designed at home and school. The team decided to address dietary behaviors (i.e., vegetable intake at home and school) next. First, goals were set for dietary target behaviors, and contributing factors to dietary concerns were discussed. BR's mother reported that BR refused to attempt to eat most vegetables, with the exception of potatoes, corn, and peas. She reported that BR ate more vegetables when her cousin was present. When BR refused to eat vegetables, her mother reported that she was not required to eat them. BR's counselor reported similar problems at

school. BR reported that she only ate carrots at school because she didn't like the look and texture of other vegetables. BR's counselor reported no consequences for BR not eating her vegetables at school. As a result, the team decided that the primary function of YB's reduced vegetable intake at home and school was low motivation and avoidance of consuming less preferred food items. An individualized plan was developed by all meeting participants to address the hypothesized functions of reduced vegetable intake at home and school.

Participants at the CPEI 2 were BR's mother, BR's school counselor, the CBC consultant, and BR. BR's mother and school counselor reported information collected regarding dietary and physical activity behaviors at home and school and reviewed the plans for both physical activity and dietary behaviors. They both reported consistent goal attainment at home and school for both target behaviors. As a result, the team decided to increase the goal for servings of vegetables consumed at home and school and continue all other dietary and physical activity plan components as originally designed. BR's mother and counselor reported that effective plan components were positive attention, rewards, and regular feedback.

YB. Participants at the CPEI 1 for YB were YB's parents, YB's classroom teacher, the CBC consultant, and YB. YB's parents and teacher provided information collected regarding target behaviors at home and school. The team reviewed the plans for dietary behaviors. YB's parents reported that YB had consumed fewer late-night snacks and made healthier choices. They reported that goal-setting and rewards helped to motivate YB at home. At school, her teacher reported that YB had met her goal most days and was eating less overall. She shared that reminders of the plan prior to lunch

appeared to help YB remember to make healthier lunch choices. The team decided to continue the plan as designed at home and school. The team decided to address physical activity behaviors (i.e., moderate to vigorous activity and participation in recess) next. Goals were set for increased amounts of physical activity at home and school and factors contributing to dietary concerns were discussed. YB's parents reported that YB was more likely to engage in moderate to vigorous activity outdoors when the weather was comfortable and YB's neighborhood friends were available. Overall, they reported that YB enjoyed engaging in activity outdoors. At school, YB's teacher reported that YB preferred to sit and talk with her friends or chose less active recess options. However, YB was more likely to engage in more vigorous activities if everyone at recess was participating. As a result, the team concluded that the primary function of YB's reduced physical activity, particularly at school, was due to lack of motivation for less preferred activities. An individualized plan was developed by all meeting participants to address the hypothesized functions of reduced physical activity.

For the CPEI 2, participants were YB's parents, YB's lunch room and recess monitor, YB's P.E. teacher, the CBC consultant, and YB. Participants reviewed information collected regarding dietary and physical activity behaviors at home and school and evaluated the plans for both physical activity and dietary behaviors. Participants from both home and school settings reported consistent goal attainment at home and school for both target behaviors. The end of the academic school year prevented plan modifications or goal adjustments at school, and YB's parents chose to continue the plans as designed at home and adjust the goals after observing one week of baseline data during the summer. YB's parents and school personnel reported that YB

appeared to respond to rewards and positive attention from adults. However, school personnel reported difficulty controlling school lunch menus and options for activities at recess.

AN. CPEI 1 participants for AN were AN's parents, AN's classroom teacher, the CBC consultant, and AN. AN's parents reported poor treatment compliance with plan implementation and data collection but anecdotally reported that AN had not participated in any physical activity at home. At school, her teacher provided data regarding AN's target behaviors at school. The team reviewed the plans for physical activity behaviors and decided to add plan modifications and reduced goals in both settings to improve treatment compliance and improve AN's likelihood of meeting goals for physical activity target behaviors. The team decided to add plans to address dietary behaviors next. Goals were set for dietary target behaviors (i.e., sneaking snacks and intake of fats/oils/sweets) at home and school and factors contributing to dietary concerns were discussed. AN's parents reported that AN was more likely to sneak snacks when she was angry at her parents, or when she was sad or depressed. In addition, AN's parents reported that they often scolded AN if they found that she had hidden snacks at home. At school, her teacher reported that AN did not like to differentiate herself from her peers, and chose lunch choices similar to that of her peers. As a result, the team decided that the primary function of AN's sneaking snacks was comfort for feelings of sadness or anger. At school, it appeared that the primary function of AN's high intake of fats, oils, and sweets was avoidance of peer attention. An individualized plan was developed by all meeting participants to address the hypothesized functions of AN's dietary behaviors.

For the CPEI 2, participants were AN's parents, AN's teacher, the CBC consultant, and AN. Participants reviewed information collected regarding dietary and physical activity behaviors at home and school and evaluated the plans for both physical activity and dietary behaviors. AN's parents continued to report poor treatment integrity at home. AN's teacher reported moderate goal attainment at school for both target behaviors. The end of the academic school year prevented plan modifications or goal adjustments at school; however, AN's parents decided to continue the plans as designed at home and adjusted goals based on summer activity levels. AN's parents and school personnel reported that AN appeared to benefit from the structure and accountability of the intervention plans as well as the praise and rewards associated with meeting her goal. They also reported that the collaborative nature of home and school working together, including regular communication, appeared to help motivate AN.

TO. Prior to the CPEI meetings, TO's mother withdrew from the study. As a result, the CPEI meeting participants for TO were TO's school nurse and the CBC consultant only. The school nurse provided data regarding TO's target behaviors at school. The plan for dietary behaviors were reviewed and a plan was added to address physical activity behaviors at school. Goals were set for the physical activity target behavior (i.e., participating in recess), and contributing factors were discussed. The school nurse reported that TO was often late transitioning from lunch to recess and then didn't have time to engage in moderate to vigorous activity at recess. When at recess, TO was reportedly engaging in activities that required less movement, such as standing and observing or talking to other children. It appeared that the primary function of TO's low participation in recess was lack of motivation for participating in active choices at recess.

An individualized plan was developed to address the hypothesized function of TO's reduced active participation in recess at school.

For the CPEI 2, participants were TO's school nurse and the CBC consultant. Information was reviewed regarding dietary and physical activity behaviors and plans were evaluated. TO's teacher reported goal attainment at school for both target behaviors. The end of the academic school year prevented continued plan modifications or goal adjustments; however, the school nurse and CBC consultant made plans for continuation of the intervention components at the beginning of the following school year. The school nurse reported that clear expectations, setting attainable goals, structured adult attention, and consistent follow-through resulted in positive health behavior changes for TO.

Health Behavior Intervention

Specific health behavior interventions were designed and implemented by participating families and school personnel across home and school settings. Each program was individualized for each child's strengths and primary health concerns. Each child's program consisted of three, standard, evidence-based components: (a) education for participating children, families, and school personnel; (b) behavior modification, which includes stimulus control, goal-setting, and reinforcement/motivational strategies; and (c) home-school communication. First, an education component took a variety of forms depending on each unique target behavior and needs of the child and her family. Second, behavior modification involved identifying the functional relationship between the environment and behaviors and implementing procedures to modify behaviors (Miltenberger, 2008). Based on principles of operant conditioning, each plan included

the components of goal setting, behavior monitoring, motivation for positive health behavior change (i.e., reinforcement), and stimulus control. Reasonable, attainable, short-term goals for behavior change related to identified target health behaviors were jointly determined by all participants and linked to reinforcement procedures. Specified behaviors were continuously monitored for progress toward goals. Reinforcement was provided by families and school personnel via verbal praise or structured reinforcement programs to encourage goal attainment for each target behavior. Third, a daily home-school communication system was included in the intervention plan. The note supported regular communication across environments regarding the child's progress and performance related to identified goals and health behaviors. Research has supported the efficacy of home-school notes for increasing home-school communication and improving child academic and behavioral performance (Cox, 2005; Galloway & Sheridan, 1994; Jurbergs, Palcic, & Kelley, 2007; Rathvon, 1999). The home-school note included information about the child's daily performance in relation to health behaviors specified in CBC interviews and provided anecdotal information about the child's progress both at home and school. A brief description of each child's plan components is summarized in Table 4.

Table 4

Plan Components

Child	Setting: Target Behavior	Education Component	Behavior Modification Component	Home-School Communication Component
BR	Home: Biking/Walking	• Provided information regarding the health benefits of walking and biking • Provided information of the recommended amount of physical activity for children • Provided information on opportunities to engage in physical activity (e.g., walking/biking instead of driving to a friend's house)	• Goal-setting for minutes engaged in walking/biking daily • Self-monitored time spent walking/biking (with parental support) • Sticker chart for daily goal attainment • Reward for weekly goal attainment for stickers earned at home	• Home-school note communicating number of minutes biking/walking at home with anecdotal comments (e.g., rewards earned, weather barriers, overall progress)
	School: Participating in P.E.	• Provided information about the benefits of physical activity • Provided information regarding what is considered moderate to vigorous activity	• Provided a point if BR was engaged in moderate to vigorous activity when observed (every 2 minutes) during P.E. class • Goal-setting for number of points earned • Reward (i.e., choice activity with school counselor) for daily goal attainment	• Home-school note communicating points earned at school and anecdotal comments (e.g., rewards earned, overall progress)

	Home/School: Vegetable Intake	• Provided information regarding serving sizes, examples of vegetables, the nutritional benefits of vegetables, and recipes including vegetables • Provided information regarding healthier choices among vegetables	• Increased availability and variety of vegetables in the home • Reviewed weekly school lunch menu prior to going to school • If no (on non preferred) vegetables were available for lunch, allowed BR to bring supplemental vegetables to school from home • Goal-setting for servings of vegetables consumed daily across home and school • Sticker chart for daily goal attainment for total vegetable servings consumed across home and school • Reward (i.e., special time with parent) for weekly goal attainment of stickers earned	• Home-school note communicating servings of vegetables consumed in each setting with anecdotal comments (e.g., rewards earned, vegetables refused, changes in routine, overall progress)
YB	Home: Snacking	• Provided a list of healthy snack options • Provided information on how to read nutrition labels • Provided information on the traffic light diet, categorizing snacks into green (healthy) and red (unhealthy) categories	• Goal-setting for number of unhealthy snacks consumed daily • Sticker chart for daily goal attainment • Grab bag reward for weekly goal attainment of stickers earned	• Home-school note communicating number of healthy and unhealthy snacks consumed at home with anecdotal comments (e.g., rewards earned, list of snacks consumed, overall progress)

School: Fruit and vegetable intake	• Provided information regarding serving sizes, examples of fruits and vegetables, and the nutritional benefits of fruits and vegetables	• Reminded YB to eat fruits and vegetables prior to eating other foods at lunch • Goal-setting for number of servings of fruits and vegetables consumed prior to eating other foods • Sticker chart at home for goal attainment at school • Grab bag reward at home for weekly goal attainment of stickers earned at school	• Home-school note communicating servings of fruits and vegetables consumed at school with anecdotal comments (e.g., rewards earned, food refused, overall progress)
Home: Moderate to vigorous activity	• Provided information about the benefits of physical activity • Provided information regarding the recommended amount of physical activity for children • Provided an explanation and examples of moderate to vigorous activity	• Goal-setting for minutes engaged in moderate to vigorous activity daily • Sticker chart for daily goal attainment • Grab bag reward for weekly goal attainment for stickers earned	• Home-school note communicating number of minutes engaged in moderate to vigorous activity at home with anecdotal comments (e.g., rewards earned, weather barriers, overall progress)

	School: Participation in recess	• Provided information about the benefits of moderate to vigorous activity • Provided information regarding the recommended amount of physical activity for children • Provided an explanation and examples of recess activities that involve *moderate to vigorous activity*	• YB choose from a list of moderate to vigorous recess activities at the beginning of recess • Goal-setting for number of minutes spent engaging in moderate to vigorous activity at recess • After meeting her goal, YB could choose from any recess activity (not on the list) and earned a sticker chart for goal attainment	• Home-school note communicating number of minutes participating in recess at school and anecdotal comments (e.g., rewards earned, weather barriers, overall progress)
AN	Home: Moderate to vigorous activity	• Provided information about the benefits of physical activity • Provided information regarding the recommended amount of physical activity for children • Provided an explanation and examples of *moderate to vigorous activity*	• Goal-setting for minutes engaged in moderate to vigorous activity daily • Access to the Wii for daily goal attainment	• Home-school note communicating number of minutes engaged in moderate to vigorous activity at home with anecdotal comments (e.g., rewards earned, weather barriers, overall progress)

School: Participation in P.E. class	• Provided information about the benefits of physical activity • Provided information regarding the recommended amount of physical activity for children • Provided information regarding what is considered *moderate to vigorous activity*	• Allowed AN to visit the school nurse prior to P.E. class • AN earned a point if she was engaged in moderate to vigorous activity when observed (every 5 minutes) during P.E. class • Goal-setting for number of points earned • Reward (i.e., lunch with teacher) for daily goal attainment	• Home-school note communicating points earned at school and anecdotal comments (e.g., rewards earned, overall progress)
Home: Sneaking snacks	• Provided a list of healthy snack options • Provided information on the traffic light diet, categorizing snacks into green (healthy) and red (unhealthy) categories	• Locked snack cabinet • Provided access to a healthy snack every day after school • Conducted random room-checks for hidden food packages or pop cans • Goal-setting for clean room checks and number of unhealthy snacks consumed daily • Rewards for goal attainment • Reminded AN to exercise when she was feeling angry or depressed (rather than eat)	• Home-school note communicating number of healthy and unhealthy snacks consumed at home with anecdotal comments (e.g., rewards earned, list of snacks consumed, overall progress)

	School: Fats/oils/sweets intake	• Provided examples of foods from the fats/oils/sweets food group • Provided information regarding the nutritional shortcomings of foods in the fats/oils/sweets food group	• Reviewed school lunch menu with AN prior to lunch to identify foods on the menu from the fats/oils/sweets food group • Goal-setting for AN and her friends for number of servings of fats/oils/sweets consumed daily • Group rewards for AN and her friends for goal attainment	• Home-school note communicating servings of fats/oils/sweets consumed at school with anecdotal comments (e.g., rewards earned, food refused, overall progress)
TO	Home: Snacking	• Conducted a walk-through of HyVee Grocery Store with a nutritionist to review the NuVal system rating the nutritional value of snack foods • Provided a list of healthy snack recipes and examples • Provided information on the traffic light diet, categorizing snacks into green (healthy) and red (unhealthy) categories	• Goal-setting for number of unhealthy snacks consumed daily • Sticker chart for daily goal attainment • Reward for weekly goal attainment of stickers earned	• Home-school note communicating number of healthy and unhealthy snacks consumed at home with anecdotal comments (e.g., rewards earned, list of snacks consumed, overall progress)

School: Sneaking snacks	• Provided information on the traffic light diet, categorizing snacks into green (healthy) and red (unhealthy) categories • Reviewed school rules regarding bringing snacks to school	• Conducted random bag and desk checks several times daily • Goal-setting for number of snacks brought to and hidden at school • Reward for goal attainment	• Home-school note communicating number of snacks hidden at school with anecdotal comments (e.g., rewards earned, snacks found, overall progress)
Home: Moderate to vigorous activity	--	--	--
School: Participation in recess	• Provided information about the benefits of moderate to vigorous activity • Provided information regarding the recommended amount of physical activity for children • Provided an explanation and examples of recess activities that involve moderate to vigorous activity	• Prompted TO to leave lunch earlier to have more time at recess • Goal-setting for number of minutes spent engaging in moderate to vigorous activity at recess • Reward for goal attainment at school	• Home-school note communicating number of minutes participating in recess at school and anecdotal comments (e.g., rewards earned, changes in schedule, overall progress)

Instrumentation

Multiple measures were used to assess the progress of participating children. The specific measures used to address the first research question (i.e., Is CBC effective for increasing healthy dietary and physical activity behaviors of children with obesity?) were the Physical Activity Questionnaire for Children, the Daily Food Report, and behavior observations by participating families, school personnel, and the CBC consultant. BMI was used to assess the second research question (i.e., Is CBC effective for improving the health status of children with obesity?). Supplemental measures were also collected to provide additional information regarding the treatment procedures. Social validity measures (i.e., Behavior Intervention Rating Scale, Child Intervention Rating Profile, Goal Attainment Scale) were also used to assess the participants' perceptions of the CBC program for health behaviors. Lastly, measures of treatment integrity (i.e., CBC Objective Checklists, Plan Summary Forms) were collected to better understand the integrity with which the CBC interviews and intervention plan procedures were carried out as they were designed.

Health Behavior Measures

Physical activity questionnaire. The *Physical Activity Questionnaire for Children* (*PAQ-C*; Crocker et al., 1997) was completed by participating children with assistance or supervision (depending on the age and reading ability of the child) from the CBC consultant. The *PAQ-C* is a seven-day recall questionnaire examining the habitual moderate to vigorous physical activity in children older than third grade. The *PAQ-C* was designed with nine questions, eight of which are used to calculate the average total

activity scores. For this study, only the eight items used to calculate the average total activity scores were administered. Items assessed physical activity completed at school, after school, and at home. Responses were provided on a Likert scale (1 = low activity; 5 = high activity) and the data were summarized via an average item score with higher scores indicating more physical activity. In addition, participants were asked whether they were ill during the previous week, preventing them from having regular physical activities, thus, affecting the score. The *PAQ-C* demonstrates acceptable measurement properties as evidenced by general item-test score characteristics such as item distribution, corrected item-total correlations and internal consistency, and test-retest reliability. The *PAQ-C* has demonstrated high scale reliability for females ($\alpha = 0.83$) and males ($\alpha = 0.80$), with the combined sample having a value of $\alpha = 0.83$. Test-retest was also reliable for both males ($r = 0.75$) and females ($r = 0.82$; Crocker et al., 1997; Janz, Lutuchy, Wenthe, & Levy, 2008). Overall validity of the *PAQ-C* was moderate and ranged from 0.39 (Caltrac accelerometer) to 0.57 (activity rating) (Crocker et al., 1997; Kowalski, Crocker, & Faulkner, 1997). Participating children completed this measure every two weeks throughout the CBC process. See Appendix B for a copy of the *PAQ-C*.

Dietary intake measure. The *Daily Food Report (DFR)* is a researcher-created 24-hour recall measure that was used as an indirect assessment of dietary intake. To examine food intake in the previous day, the child and her parent together indicated if she had consumed each of 50 common food selections. To facilitate interpretation, food items on the DFR are categorized based on the Traffic Light Diet (Epstein et al., 1994, 2000a, 2000b; 2004). Of the 50 food selections, 25 are "green" foods and 25 are "red"

foods. Green foods are low energy density (less calories for a greater amount of food) and are very low in fat and concentrated sugar. Red foods provide less nutrition for the number of calories and fat grams. Each child and her parents worked together to indicate if she had consumed each food item on the DFR in the previous 24 hours. The child and her family did not provide quantities, only intake or no intake of each item. At the initial session, the administrator explained the food selections in-person and each item also included a picture to assist in identification of food items. This allowed for the administrator (i.e., CBC consultant) to clarify and answer any questions about the items. A formula was used to determine the proportion of green items consumed to red items consumed daily (i.e., green-red/green+red). Negative proportions indicate that BR consumed more red foods than green foods, and positive proportions indicate more green foods than red foods consumed. To investigate this measure's utility with children, it was piloted with children aged 8 to 10 years prior to study initiation. See Appendix C for a copy of the *Daily Food Report*.

Behavioral observations. Direct observations of each child's target health behaviors during target times (identified during the CNII) also provided data for the dependent variable. Participating family and school personnel and the CBC consultant directly observed and recorded specified, prioritized health behaviors as they occurred in the natural environment. Recordings of behavior observations were conducted during baseline phase (i.e., prior to intervention implementation) and throughout and following intervention implementation. This allowed for evaluation of behavior occurrence before and after treatment. Specific data collection methods were individually chosen to be

most appropriate for each identified child and behavior. Each behavior was defined operationally in clear, objective, and measureable terms to facilitate accurate observations and recordings. A brief description of measurement procedures used for each child's target behaviors (with definition) is provided in Table 5.

Table 5

Target Behaviors and Measurement Procedures

Child	Setting	Dietary Behaviors	Measurement Procedures	Physical Activity Behaviors	Measurement Procedures
BR	Home	Vegetable intake: Vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other cooked or raw vegetables, 0.75 cup vegetable juice) consumed by BR daily.	Recorded servings of vegetables consumed	Biking/walking: The number of minutes BR spends moving forward while sitting or standing on her bike (i.e., feet are off the ground and moving the pedals) or walking (i.e., one foot placed in front of the other) outside.	Timed number of minutes engaging in biking/ walking
	School	Vegetable intake: Vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other cooked or raw vegetables, 0.75 cup vegetable juice) consumed by BR daily.	Recorded servings of vegetables consumed	Participating in P.E.: During P.E. class, BR is engaged in moderate to vigorous activity (e.g., playing basketball, running, jumping, throwing).	Conducted momentary time sampling every 2 minutes; *participation* or *no participation* was indicated using a + or a – (respectively); percentage of samples of participation was calculated daily

YB	Home	Snacking: Foods consumed by YB outside of scheduled meal times daily	Recorded the number of red snacks consumed and number of green snacks consumed (based on traffic light diet classifications) and calculated a proportion of healthy to unhealthy snacks consumed	Moderate to vigorous activity: YB is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed.	Timed number of minutes engaged in moderate to vigorous activity and divided by number of minutes of recess offered daily for a percentage of time engaged in moderate to vigorous activity
	School	Fruit and vegetable intake: Fruit (i.e., 1 medium piece of fruit, ½ cup berries or diced fruit, ¼ cup dried fruit) and vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other cooked or raw vegetables, 0.75 cup vegetable juice) consumed by YB daily.	Recorded the number of servings of fruits and servings of vegetables consumed	Participating in recess: During recess, YB is engaged in moderate to vigorous activity (e.g., hula hoop, running, jump rope).	Timed the number of minutes participating in recess

AN	Home	Sneaking snacks: Foods consumed by AN outside of scheduled meal times without previous permission from parents daily.	Recorded the number of snacks consumed by AN; snacks consumed could be observed, reported by AN, or food packages found hidden in AN's bedroom, bathroom, or belongings	Moderate to vigorous activity: AN is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed.	Timed number of minutes engaged in moderate to vigorous activity
	School	Fats/oils/sweets intake: Servings of fats/oils/sweets (e.g., butter, fried foods, gravy, salad dressing, candy, sweet desserts, soda pop) consumed by AN daily.	Recorded number of servings of fats/oils/sweets consumed at lunch	Participating in P.E. class: During P.E. class, AN is engaged in moderate to vigorous activity (e.g., playing basketball, running, kicking).	Conducted momentary time sampling every 5 minutes; *participation* or *no participation* was indicated using a + or a – (respectively); percentage of samples of participation was calculated daily
TO	Home	Snacking: Food consumed by TO outside of scheduled meal times daily.	Recorded the number of red snacks consumed and number of green snacks consumed (based on traffic light diet classifications) and calculated a proportion of healthy to unhealthy snacks consumed	Moderate to vigorous activity: TO is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed.	Timed number of minutes engaged in moderate to vigorous activity

School	Sneaking snacks: Foods or food wrappers found hidden in TO's possessions (e.g., backback, desk) at school.	Recorded the number of food wrappers or containers hidden by TO	Participating in recess: During recess, TO is engaged in moderate to vigorous activity (e.g., running, jumping, skipping).	Timed the number of minutes participating in recess

Health Status Measures

BMI is a widely-used, reliable indicator of body fatness and is an acceptable tool for determining overweight and obesity in youth (Wang, 2004). BMI has been identified as an easy-to-perform, inexpensive, and reliable alternative to direct measures of body fat (Semiz et al., 2007; Wang, 2004). BMI is highly correlated with other measures of body mass, such as dual-energy X-ray absorptiometry (DXA), a measure of body density (Goran, Driscoll, Johnson, Nagy, & Hunter, 1996; Gutin et al., 1996), skinfold thickness (Gutin et al., 1996), and ultrasonographic measurements of fat thickness (Semiz et al., 2007). Each child's BMI was computed from her height and weight (kg/m^2). Each child's height was measured without shoes, to the nearest quarter of an inch using the measuring bar on a standard stadiometer. Weight was measured in light clothing, also without shoes, to the nearest quarter of a pound using a calibrated standard digital scale. Children were prompted to get on the scale backwards so that they did not know their exact weight. However, children were provided feedback throughout the treatment stages as to whether their BMI had increased, decreased, or stayed the same. For children and adolescents, BMI varies with age and sex. As a result, obesity in children is derived from gender and age specific BMI charts based on national statistics (Kuczmarski et al., 2002; Ogden et al., 2002), and BMI calculations were compared to a BMI-for-age growth chart provided by the Center for Disease Control to determine percentile rankings. Participating children's BMI percentile rankings were used to indicate changes in overall health. For this study, a trained nurse or P.E. teacher measured each participant's height and weight using the same scales at each measurement. The child's BMI was assessed

once prior to intervention implementation (i.e., baseline) and bi-weekly following intervention implementation. Each child's weight was also measured at regular visits to her pediatrician and this information was collected after obtaining written consent from each child's parents.

Measures of Social Validity

Intervention acceptability and efficacy. After completion of CBC, participating children, families, and school personnel reported their perceptions of the acceptability and efficacy of the health behavior intervention using the *Behavior Intervention Rating Scale* – Revised (*BIRS-R*; Von Brock & Elliott, 1987) and the *Children's Intervention Rating Profile* (*CIRP*; Witt & Elliott, 1985). The *BIRS-R* is a 24-item scale with responses on a 6-point Likert scale (1 = high perceived efficacy; 6 = low perceived efficacy). Factor analysis revealed three factors: Acceptability, Effectiveness, and Time to Effect (Elliott & Von Brock Treuting, 1991). The Acceptability factor is comprised of 15 items and yields information regarding the acceptability of intervention procedures. The Effectiveness factor is comprised of 7 items that assess perceptions of the overall efficacy of the intervention plan. Lastly, the Time to Effect factor includes 2 items measuring the satisfaction with the time required for the intervention to result in a desired outcome. Average item scores were calculated for each factor to account for incomplete items. As a result, possible scores range from 1 (high perceived efficacy) to 6 (low perceived efficacy). Alpha coefficients for the total scale, Acceptability, Effectiveness, and Time to Effect factors are 0.97, 0.97, 0.92, and 0.87, respectively (Von Brock & Elliot, 1987). The *BIRS-R* has previously been utilized to document social validity

outcomes in CBC (Cowan & Sheridan, 2003; Finn & Sladeczek, 2001; Sladeczek et al., 2006). See Appendix D for a copy of the *BIRS-R*.

The *CIRP* (Witt & Elliott, 1985; Appendix E) is a brief, 7-item questionnaire with responses on a 5-point Likert scale (1 = I agree very much; 5 = I disagree very much) that is designed to measure the participating child's perception of the acceptability of the intervention. The *CIRP* is written at fifth-grade readability, but questions were read allowed to each child by the primary investigator. Several items were adapted for the present study such as changing "problem behaviors" to "health behaviors." Items 2, 3, and 4 were reverse coded. Then average item scores were calculated to account for incomplete items. As a result, possible scores range from 1 (high perceived efficacy) to 5 (low perceived efficacy). The CIRP lacks empirical evidence of its psychometric properties; however it has been used frequently to investigate children's acceptability of various interventions in research and practice. Participants completed the modified version of the *CIRP* at the conclusion of the intervention.

Goal attainment scaling. During implementation of the health intervention plan, families and school personnel completed a Goal Attainment Scale (*GAS*; Kiresuk, Smith, & Cardillo, 1994) to assess their perceptions of the child's health behavior goal attainment. Family and school personnel rated the degree to which they perceived that the child's specific health behavior goal (identified during CPAI stage of CBC) was met on a scale from -3 (situation got significantly worse) to +3 (goal completely met). Previous research utilizing the *GAS* in the context of CBC found that it is a valuable measure for assessing perceptions of the child's progress toward goals over time

(Sheridan et al., 2001; Sladeczek et al., 2001). As a result, the *GAS* was completed by families and school personnel weekly during plan implementation. The *GAS* has been shown to have high reliability and validity (Hurn, Kneebone, & Cropley, 2006; Kaplan & Smith, 1977; Shefler, Canetti, & Wiseman, 2001). The *GAS* interrater reliability was between $r = 0.87$ (Kaplan & Smith, 1977) and $r = 0.88$ (Shefler et al., 2001). Additionally, evidence has been found for moderate to high convergent validity (Shefler et al., 2001; Willer & Miller, 1976). See Appendix F for a copy of the *GAS*.

Measures of Treatment Integrity

CBC integrity. To ensure the CBC interviews were carried out as they were designed, CBC Objective Checklists (Sheridan et al., 2001; see Appendix G) were used to assess the execution of CBC interview objectives by the consultant. The consultant audio recorded each CBC interview, and trained coders assessed 30% of the interviews for adherence to the interview objectives. One-third of the interviews were coded by two raters and interrater reliability was calculated.

Health behavior intervention implementation integrity. To understand the fidelity with which the participating families and school personnel implemented the health behavior intervention as designed, intervention implementation integrity was assessed. The intervention plan steps (individualized for each child) were listed in clear, objective terms on a "Plan Summary Form" (see Appendix H for an example). For each intervention step, the family and school personnel recorded "yes" if they completed the step, "no" if they did not complete the step, or "NA" (not applicable) for situations in which the step could not be competed due to circumstances (e.g., child did not display

prerequisite behavior, child or school personnel was absent). The Plan Summary Form was collected by the consultant weekly in conjunction with the Goal Attainment Scale. Additionally, the consultant monitored implementation of the intervention at school and home. During observations, the observer also recorded implementation of each intervention step on a consultant-completed Plan Summary Form. In some cases (i.e., AN, TO), implementation integrity was poor. For these cases, the CBC consultant emphasized the rationale and goals for the program, assessed practicability of plan steps, and made plan changes to make implementation more feasible. In addition, for AN, home visits were conducted to model correct procedures.

Experimental Design

The efficacy of the health behavior intervention for children with obesity in the context of CBC was evaluated via a multiple-baseline design across behaviors. The intervention was presented to each of two different baselines (i.e., health behaviors) at different points in time to determine if the application of the intervention was truly influencing any observed change in behavior. A multiple-baseline design allows for the investigation of the effectiveness of the independent variable (i.e., multicomponent health behavior intervention) on the dependent variables (i.e., dietary and physical activity behaviors and body mass index) for a small sample of participants (Kazdin, 1982). Each participant served as her own control by the systematic manipulation of the application of the health behavior intervention within CBC to each health behavior, while all other variables were held constant. If a systematic change was observed in each behavior only when the intervention was applied, it was evident that the effects were attributable to the

intervention rather than to extraneous events. Therefore, the multiple baseline design controls for threats to internal validity such as the effects of maturation or history. This process was replicated across all four participants to further demonstrate experimental control. A multiple baseline approach is the most intensive and rigorous experimental design in single-subject research and has been found to be a highly reliable and valid research design (Kazdin, 1982).

Baseline

A minimum of three behavior observations were conducted for each participant prior to the implementation of the health behavior intervention to establish baseline data simultaneously on both health behaviors (i.e., dietary and nutrition behavior). The first behavior addressed by the intervention program was individually determined by all participants (i.e., families, school personnel, child, consultant) based on largest contributing concern, ease of change, and preference of participants. The first behavior, therefore, had a shorter baseline period than the second behavior.

Treatment: Behavior 1

In the multiple baseline design across behaviors, this phase represented the effects of the health behavior intervention implemented in the context of CBC on the first health behavior. During this phase, data collection continued in the same manner as baseline for both target behaviors. However, the first behavior was in the treatment phase, while the other behavior remained unaffected (baseline). When the intervention showed a stable effect for the first behavior, the intervention was applied to a second behavior. Although the transition to the treatment phase from the baseline phase for each behavior was

informed by stability in baseline data, the consultant considered the needs of the participants and transitioned when it was clinically appropriate.

Treatment: Behavior 2

The next phase represented the effects of the health behavior intervention implemented in the context of CBC on the second health behavior. The treatment was applied to the second target behavior. During this phase, the treatment program was in effect for both health behaviors, and data collection continued in the same manner as baseline for both health behaviors. However, both health behaviors were in the treatment phase.

Follow-up

To examine the maintenance of the treatment effects over time, follow-up analyses were conducted approximately 19 weeks following the final CBC interview. Direct behavior observations and the DFR were collected daily by families and school personnel for one week at home and school and BMI measurements were completed once for each participating child.

Data Analysis

A number of methods were employed to analyze data within the multiple-baseline design. Primary data analyses included visual inspection with structured criteria, percentage of all nonoverlapping data, and social validation. Each of these methods was utilized for this project to form a comprehensive understanding of treatment effects.

Visual Inspection

A visual inspection of the behavior observation data was used to evaluate intervention effects by visually comparing baseline levels of behavior to levels after intervention implementation. In order to improve the reliability of visual inspection (Knapp, 1983) and decrease Type I error, the dual-criterion (DC) and conservative dual-criterion (CDC) methods developed by Fisher, Kelley, and Lomas (2003) were used. The dual-criterion method involves comparing the treatment data points to a mean and trend line from the data points in the baseline phase. The conservative dual-criterion (CDC) method further reduces Type I error by raising both of these lines 0.25 of a standard deviation (based on baseline data). When the number of treatment data points that fall above (or below) each of the lines exceeds chance expectation, a significant treatment effect is considered to be present. The number of intervention data points needed to achieve significance is based on the binomial sampling distribution which determines the probability between a point falling above the lines or below the lines. To maintain high experimental rigor, the conservative dual-criterion method was used to evaluate the data for this study.

Percentage of All Nonoverlapping Data

The percentage of all nonoverlapping data (PAND) between baseline and treatment across both behaviors was calculated. PAND is an extension of percentage of nonoverlapping data (PND). PAND addresses limitations of PND such as overemphasis on one (potential outlying) data point and no relation to an effect size. The PAND was computed by (a) adding the number of overlapping data points (minimum number of data points that would have to be removed for complete separation between phases), (b)

dividing the number of overlapping data points by the total number of data points to determine a percentage of overlapping data, (c) subtracting the percentage of overlapping data from 100 to determine the percentage of *non*overlapping data (Parker, Hagan-Burke, & Vannest, 2007). Larger PANDs represent higher treatment efficacy.

Social Validity

Social validity assessment refers to the social significance of the goals of an intervention, the intervention procedures, and the intervention effects (Gresham & Lopez, 1996). Social validity was assessed via child report on the *Child Intervention Rating Profile* (*CIRP*; Witt & Elliott, 1985) and parent and school personnel data from the *Behavior Intervention Rating Scale – Revised* (*BIRS-R*; Von Brock & Elliot, 1987) and the *Goal Attainment Scale* (*GAS*; Kiresuk, Smith, & Cardillo, 1994). The *BIRS-R* and *CIRP* were completed following the conclusion of CBC interviews by the participating families and school personnel to assess their perceptions of the acceptability and effectiveness of the health behavior intervention. The *GAS* was completed weekly during the treatment phase to gauge the perceptions of the families and school personnel regarding the attainment of the child participants' health behavior goals for each behavior.

CHAPTER 3

RESULTS

First, this chapter summarizes health behavior outcome data for each participating child. Health behavior outcome data include individualized dietary and physical activity health behaviors observed at home and school as well as broad measures of dietary intake and physical activity (i.e., Daily Food Report, Physical Activity Questionnaire). Second, health status for each child is summarized via measurements of BMI. Lastly, social validity and treatment integrity data are described.

Health Behavior

The efficacy of the health behavior intervention for children with obesity in the context of CBC was evaluated via a multiple baseline design across behaviors (i.e., one physical activity behavior, one dietary behavior). Individualized health behaviors were measured using behavior observations of dietary and physical activity behaviors in both the home and school settings. Broad indicators of overall health behaviors were also assessed via the PAQ-C and DFR. Means and standard deviations for individualized health behaviors for each phase are summarized for each child in Tables 6 and 7. Visual analyses indicators of improvements in health behaviors across baseline and treatment phases including immediacy of change (i.e., positive change in value between last baseline data point and first treatment data point), change in level (i.e., improved values of most data points), and structured criteria for visual inspection using CDC are summarized as well as PAND for each child across settings in Tables 8 and 9.

Table 6

Child Participants' Health Behavior Data at Home

Child	Behavior (Metric)	Baseline Mean(SD)	Treatment Mean(SD)	Follow-Up Mean(SD)	Improved Mean Change (Baseline to Treatment)
BR	Biking/Walking (Number of minutes)	21.43(15.74)	81.82(41.91)	58.33(42.27)	+
	Vegetable Intake (Number of servings)	1.10(1.00)	1.34(1.02)	1.12(0.67)	+
YB	Snacking (Proportion of healthy to unhealthy snacks consumed)	-0.43*(0.53)	0.56(0.50)	NA	+
	Moderate to Vigorous Activity (Number of minutes)	52.36(50.79)	100.00(52.03)	145.71(76.35)	+
AN	Moderate to Vigorous Activity (Number of minutes)	1.67(2.58)	27.30(28.86)	NA	+
	Sneaking Snacks (Number of snacks)	1.25(0.50)	0.63(1.06)	NA	+
TO	Snacking (Proportion of healthy to unhealthy snacks consumed)	-0.44*(0.51)	0.50(0.58)	NA	+

*Negative proportions indicate more unhealthy foods than healthy foods consumed.

Table 7

Child Participants' Health Behavior Data at School

Child	Behavior (Metric)	Baseline Mean(SD)	Treatment Mean(SD)	Follow-Up Mean(SD)	Improved Mean Change (Baseline to Treatment)
BR	Participation in P.E. (Percentage of intervals)	13.93%(0.14)	59.26%(0.24)	67.40%(0.19)	+
	Vegetable Intake (Number of servings)	1.10(1.00)	1.34(1.02)	1.12(0.67)	+
YB	Fruit and Vegetable Intake (Number of servings)	0.40(0.38)	1.28(0.52)	2.30(0.45)	+
	Participation in Recess (Percentage of recess)	13.67%(0.08)	43.33%(0.10)	100.00%(0)	+
AN	Participation in P.E. Class (Percentage of intervals)	0.00%(0)	48.89%(0.30)	NA	+
	Fats, oils, and sweets intake (Number of servings)	1.63(0.60)	0.88(0.93)	NA	+
TO	Sneaking snacks (Number of snacks)	1.00(0.82)	0.07(0.26)	0.40	+
	Participation at recess (Number of minutes)	3.67(3.32)	12.30(5.62)	0.50	+

Table 8

Measures of Treatment Effectiveness for Health Behaviors at Home

Child	Behaviors	Immediacy	Level Change	Substantial CDC	PAND	Experimental Control
BR	Biking/ Walking	+	+	+	77.4%	Moderate
	Vegetable Intake	-	-	-		
YB	Snacking	+	+	+	83.3%	High
	Moderate to Vigorous Activity	-	+	+		
AN	Moderate to Vigorous Activity	-	+	-	75.0%	Moderate
	Sneaking Snacks	-	+	+		
TO	Snacking	+	+	+	85.7%	NA

+ = Measure of treatment effectiveness was observed

- = Measure of treatment effectiveness was not observed

NA = Information not available due to limited data

Table 9

Measures of Treatment Effectiveness for Health Behaviors at Schools

Child	Behaviors	Immediacy	Level Change	Substantial CDC	PAND	Experimental Control
BR	Participation in P.E.	-	+	+	77.4%	Moderate
	Vegetable Intake	-	-	-		
YB	Fruit and Vegetable Servings	+	+	+	94.5%	High
	Moderate to Vigorous Activity	+	+	+		
AN	Participation in P.E.	+	+	+	83.8%	High
	Fats, Oils, and Sweets Intake	+	+	-		
TO	Sneaking Snacks	+	+	+	91.9%	High
	Participation in Recess	-	+	-		

+ = Measure of treatment effectiveness was observed

- = Measure of treatment effectiveness was not observed

BR

Individualized health behaviors at home. Throughout the CBC process for BR, the team developed a plan to address physical activity behaviors first. The physical activity target behavior chosen at home was *biking/walking*. Biking/walking was defined as "the number of minutes BR spent moving forward while sitting or standing on her bike (i.e., feet are off the ground and moving the pedals) or walking (i.e., one foot placed in front of the other) outside." Biking/walking was measured at home by timing the number of minutes BR spent engaging in biking/walking activities. During baseline, BR engaged in biking/walking a daily average of 21.43 minutes (*SD* = 15.74), with a range from 0 to 40 minutes. During the treatment phase, the average number of minutes BR was engaged in biking/walking daily increased to 81.82 minutes (*SD* = 41.91), with a range of 0 to 195. These data indicated an increase in biking/walking from baseline to treatment. The percentage of all nonoverlapping data (PAND) was 87.5%, or 37.5% beyond chance level. Visual inspection indicated an immediate change in level and visual inspection using structured criteria via the conservative dual criterion (CDC) confirmed a substantial treatment effect. Overall, these data indicated substantial treatment effects for biking/walking at home. Follow-up data collected approximately 20 weeks after the final CPEI revealed BR engaged in biking/walking an average of 58.33 minutes (*SD* = 42.27) daily, ranging from 0 to 125. These data indicated that treatment effects were generally maintained at follow-up.

Secondly, the team addressed dietary behaviors for BR. *Vegetable intake* was chosen as BR's second target behavior for both home and school. Vegetable intake was defined as "vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other

cooked or raw vegetables, 0.75 cup vegetable juice) consumed by BR daily" and was measured by recording the number of servings of vegetables consumed across both home and school. During baseline, BR consumed an average of 1.10 servings (*SD* = 1.00) of vegetables daily, with a range of 0 to 4. During treatment, BR consumed an average of 1.34 servings (*SD* = 1.02) of vegetables daily, with a range of 0 to 3.50. PAND was 69.5%, or 19.5% beyond chance level. Visual inspection across phases indicated no immediacy, no clear changes in level or trend, and structured criteria using CDC indicated no treatment effects. These data indicated moderate treatment effects for vegetable intake across home and school. Follow-up data indicated an average of 1.12 servings (*SD* = 0.67) of vegetables consumed daily across home and school (range from 0 to 1.75), indicating a return to baseline levels of vegetable intake at follow-up.

Visual analyses of the multiple baseline data across behaviors at home revealed baseline data for the dietary behavior (i.e., vegetable intake) did not change in stability, level, or trend as treatment was initiated for the physical activity behavior (i.e., biking/walking). The introduction of treatment resulted in substantial improvements for walking/biking at home. However, the introduction of treatment did not result in a substantial improvement in vegetable intake across home and school. Data across behaviors in the multiple baseline design were also used to calculate the PAND (Parker et al., 2007). PAND across behaviors was 77.4%, or 27.4% beyond chance level. Overall, these data are unclear if the treatment was solely responsible for improvements in physical activity at home as opposed to extraneous variables. Furthermore, effects appeared to maintain over time for biking/walking, but not for vegetable intake.

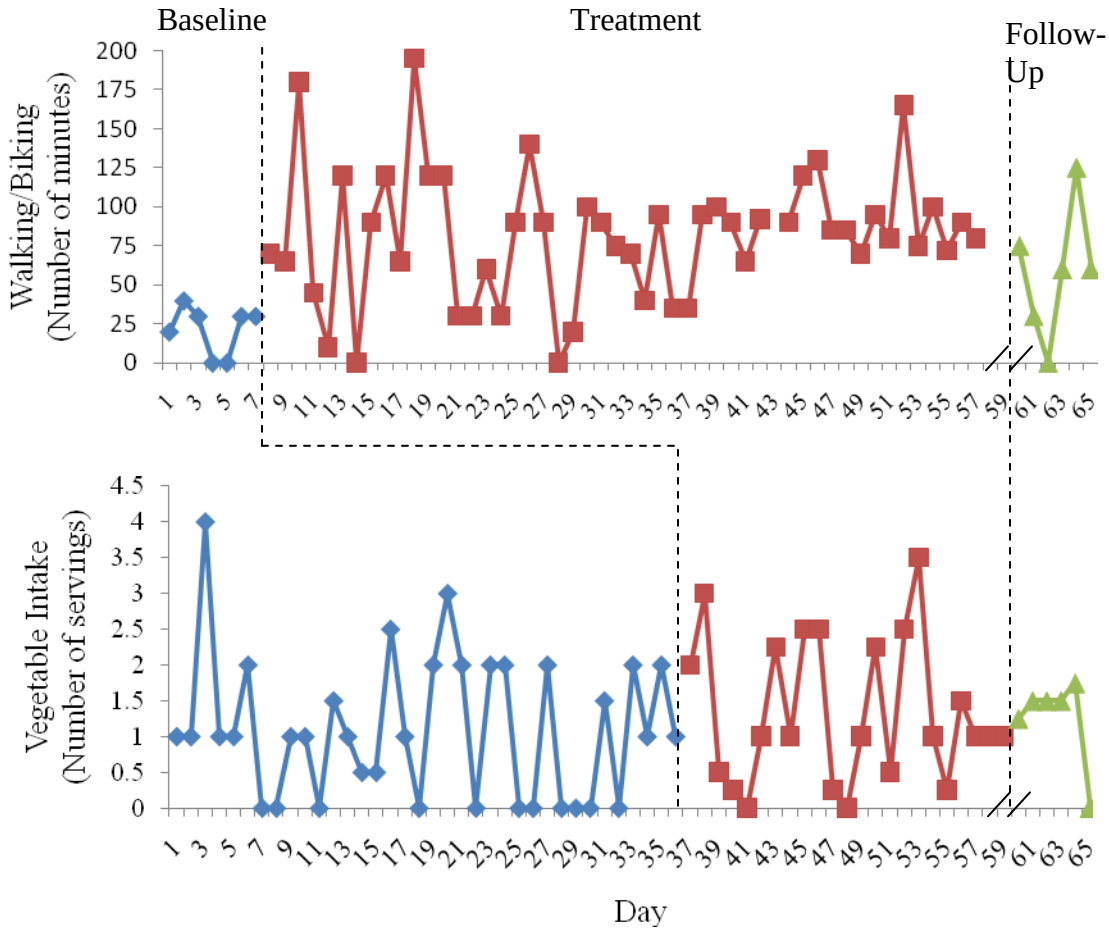

Figure 1. Multiple baseline graph for BR's individualized health behaviors at home.

Individualized health behaviors at school. The physical activity target behavior chosen at school was *participation in P.E. class* at school and was targeted first. Participation in P.E. class was defined as "during P.E. class, BR is engaged in moderate to vigorous activity (e.g., playing basketball, running, jumping, throwing)." Participation was measured using momentary time sampling every 2 minutes. That is, BR was momentarily observed at the end of each 2 minute interval and p*articipation* or *no*

participation was indicated using a + or a –. The percentage of samples BR was observed engaging in moderate to vigorous activity was then calculated. During baseline, BR was participating in P.E. class an average of 13.93% (*SD* = 0.14) of observation intervals, with a range from 0.00% to 28.57%. During treatment, BR participated in 59.26% (*SD* = 0.24) of intervals, with a range from 14.29% to 100.00%. These data indicated an increase in participation in P.E. from baseline to treatment phases. The PAND was 96.3%, or 46.3% beyond chance level. Visual inspection indicated delayed improvements, a change in level, and structured criteria using the CDC indicated a substantial treatment effect. Also, an ascending data trend was apparent during the treatment phase. Collectively, these data indicated substantial treatment effects for participation in P.E. at school. During follow-up, collected 17 weeks after the final CPEI, BR participated in P.E. class an average of 67.40% (*SD* = 0.19) of observation intervals, with a range from 50.0% to 100.0%. This represented an increase from the treatment phase. These data indicated that treatment effects were maintained at follow-up. The second individualized health behavior targeted at school was vegetable intake across home and school, as described above.

Visual analyses of the multiple baseline data across behaviors at school revealed baseline data for the dietary behavior (i.e., vegetable intake) remained stable as treatment was initiated for the physical activity behavior (i.e., participation in P.E.). Substantial improvement was observed for participation in P.E. following the introduction of the treatment program. However, a clear improvement in vegetable intake across home and school was not observed. The overall PAND was 77.4%, or 27.4% beyond chance level.

Taken together, it is uncertain if improvements in participation in P.E. were due solely to the treatment as opposed to extraneous variables.

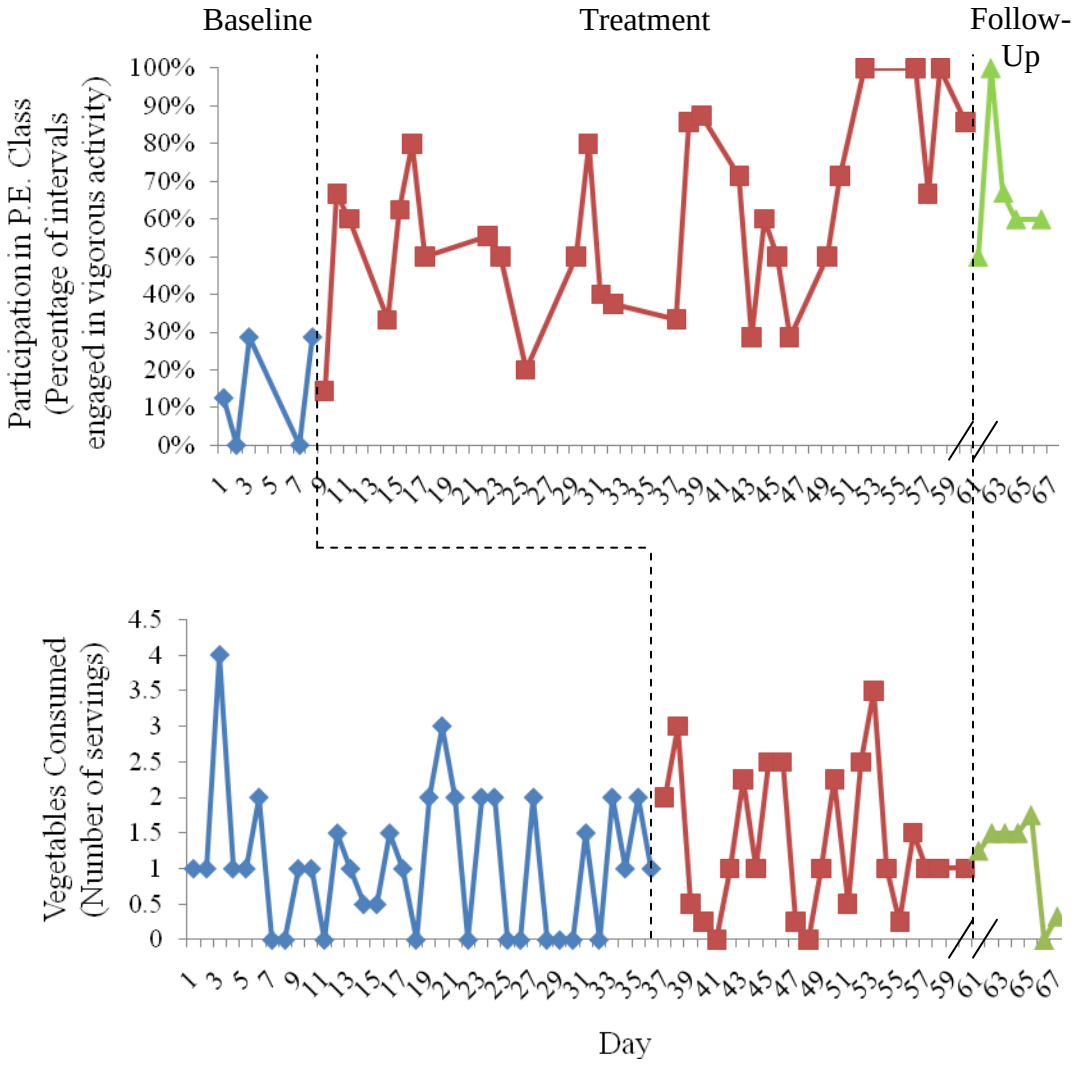

Figure 2. Multiple baseline graph for BR's individualized health behaviors at school.

Broad measures of health behaviors. BR completed the *Physical Activity Questionnaire for Children* (*PAQ-C*) measure once prior (i.e., baseline) and every two weeks after CBC intervention implementation. Item scores on the PAQ-C ranged from 1

to 5, with higher mean item scores indicating increased physical activity. At baseline, BR's mean item score was 2.86. During treatment, the average item score reported by BR was 3.30, indicating an increase in mean item score of 0.44 between baseline and treatment. This suggests a slight increase in physical activity from baseline to treatment as reported by BR. However, analyses using visual inspection and PAND for the PAQ-C could not be calculated due to a limited number of baseline data.

BR's parents also completed the *Daily Food Report* (*DFR*) to examine daily food intake from a selection of 50 commonly-consumed food selections, including 25 red (unhealthy) and 25 green (healthy) foods. A formula indicating the proportion of green items to red items consumed daily was used to describe daily food intake. Negative proportions indicate that BR consumed more red foods than green foods, and positive proportions indicate more green foods than red foods consumed. During baseline, BR consumed a daily average of -0.58, with a range of -1.00 to 0.00. During treatment, BR consumed an average of -0.19, with a range of -0.71 to 0.60. These data indicated an increase in the proportion of green items to red items consumed; however, BR continued to consume more red than green items, on average, during the treatment phase. Visual inspection indicated a change in level across baseline and treatment phases, and structured criteria using CDC indicated a substantial treatment effect. PAND was 70.9%, or 20.9% beyond chance level. These data indicate large treatment effects for daily food intake. During follow-up, BR consumed a daily average of -0.04, with a range of -0.50 to 0.20. This indicates continued improvement over time; however, continued consumption of more unhealthy than healthy items.

YB

Individualized health behaviors at home. For YB, the team determined a need to develop a plan to address dietary behaviors first. The dietary behavior chosen at home was *snacking*. Snacking was defined as "foods consumed by YB outside of scheduled meal times daily." Snacks were recorded based on the number of green (healthy) and red (unhealthy) snacks consumed daily, based on the Traffic Light Diet classifications. A formula indicating the proportion of green snacks consumed to red snacks consumed daily summarized the daily snack intake. Negative proportions indicated more red snacks consumed and positive proportions indicating more green snacks consumed. During baseline, YB consumed a daily average of -0.43 (*SD* = 0.53), with a range of -1.00 to 0.00. During treatment, YB consumed an average of 0.56 (*SD* = 0.50), with a range of 0.00 to 1.00. These data indicate an increase in the proportion of green snacks to red snacks consumed from baseline to treatment. Further, PAND was 91.5%, or 41.5% beyond chance level. Visual inspection indicated an immediate change in level across phases and the conservative dual criterion (CDC) confirmed a substantial treatment effect. Overall, these data indicated substantial treatment effects for snacking at home. Follow-up data collected approximately 20 weeks after the final CPEI revealed that YB did not consume any snacks outside of meal times during follow-up data collection, so proportion formulas did not reveal that YB consumed more of one group (i.e., red or green snacks). The total number of snacks consumed (i.e., 0) represented a decrease from baseline and treatment phases.

Secondly, the team addressed physical activity behaviors for YB. *Moderate to vigorous activity* was defined as "YB is engaging in activity in which her body is moving, she is breathing harder than at sitting, and her cheeks are flushed." Activity was

measured by timing the number of minutes YB engaged in moderate to vigorous activity. During baseline, YB engaged in an average of 52.36 minutes (*SD* = 50.79) of moderate to vigorous activity daily, with a range of 0 to 180. During treatment, YB engaged in an average of 100.00 minutes (*SD* = 52.03) of moderate to vigorous activity daily, with a range of 0 to 180. PAND was 76.7%, or 26.7% beyond chance level. Visual inspection indicated no immediacy, a change in level across phases, and substantial treatment effects using CDC. These data indicate substantial treatment effects for moderate to vigorous activity at home. Follow-up data collected approximately 20 weeks after the last CPEI meeting indicated that YB engaged in an average of 145.71 minutes (*SD* = 76.35) of moderate to vigorous activity daily, with a range from 0 to 210. YB was ill on one follow-up day, resulting in 0 minutes of moderate to vigorous activity on one day of data collection. These data represent an increase in moderate to vigorous activity from treatment to follow-up, indicating that treatment effects were maintained and improved over time.

Visual analyses of the multiple baseline data across behaviors at home revealed baseline data for moderate to vigorous activity did not change in stability, level, or trend as treatment was initiated for snacking. Additionally, the introduction of treatment resulted in substantial improvements for snacking and moderate to vigorous activity at home. Further, overall PAND was 83.3%, or 33.3% beyond chance level. Therefore, the data indicated that the treatment was responsible for the improvements in the individualized dietary and physical activity behaviors at home as opposed to extraneous variables. Furthermore, these effects appeared to be maintained over time.

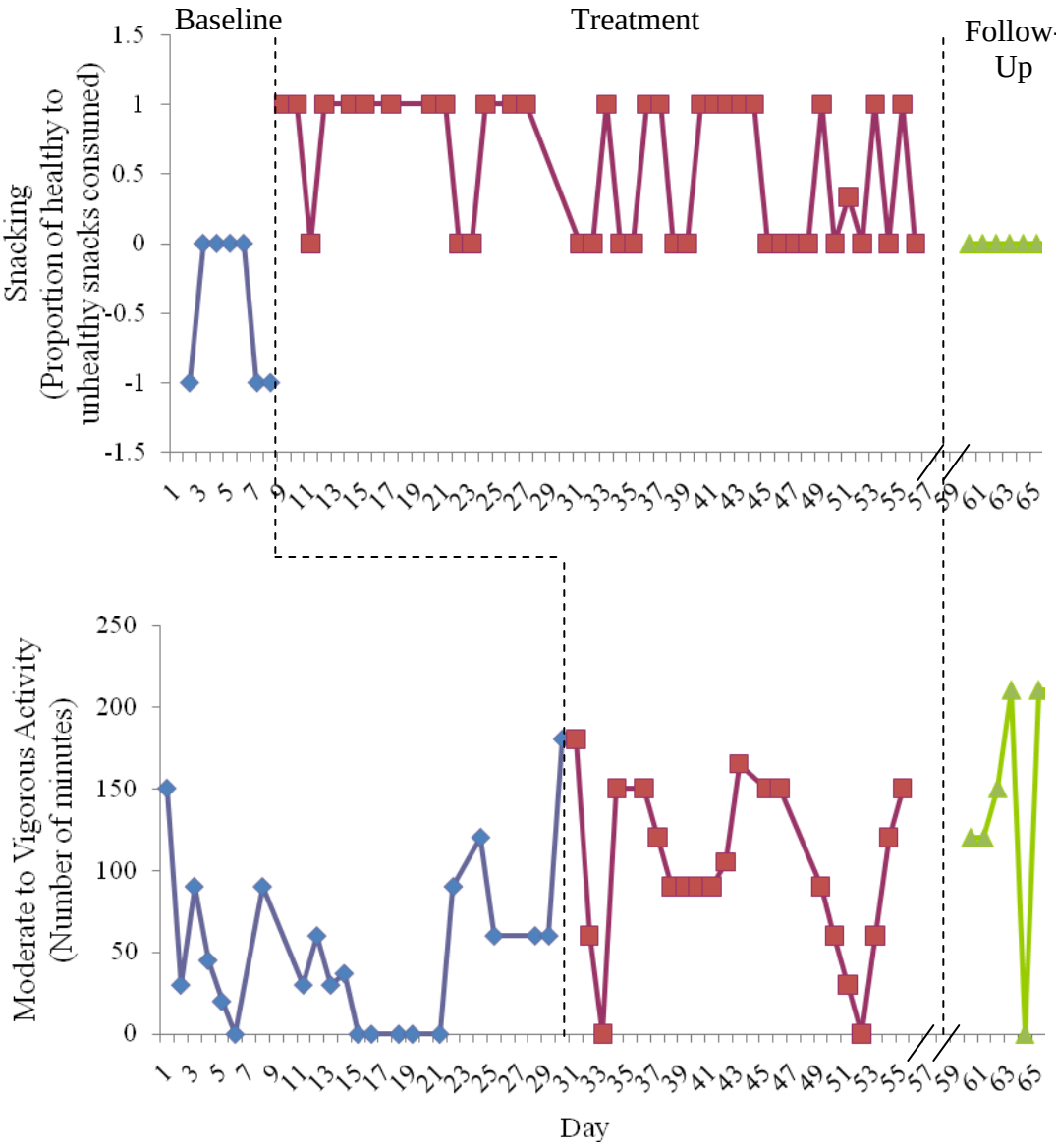

Figure 3. Multiple baseline graph for YB's individualized health behaviors at home.

Individualized health behaviors at school. Health behaviors targeted at school for YB were fruit and vegetable intake and participation in recess. *Fruit and vegetable intake* was chosen by the team to be targeted first. This health behavior was defined as "fruit (i.e., 1 medium piece of fruit, ½ cup berries or diced fruit, ¼ cup dried fruit) and vegetable servings (i.e., 1 cup of raw leafy vegetables, 0.5 cup of other cooked or raw

vegetables, 0.75 cup vegetable juice) consumed by YB daily." Baseline data collection indicated that YB consumed an average of 0.40 servings (*SD* = 0.38) of fruits and vegetables during lunch at school, with a range of 0 to 1. During treatment, YB ate an average of 1.28 servings (*SD* = 0.52) of fruits and vegetables at lunch, ranging from 0 to 2, indicating a daily increase in the number of fruits and vegetables consumed from baseline to treatment phases. The PAND was 92.9%, or 42.9% beyond chance level. Visual inspection indicated an immediate change in level across phases and the conservative dual criterion (CDC) confirmed a substantial treatment effect. Taken together, data indicate that the program had a significant impact on YB's fruit and vegetable intake at lunch. Follow-up data collected 28 weeks after the final CPEI revealed that YB ate an average of 2.30 servings (*SD* = 0.45) of fruit and vegetables at lunch, with a range from 2 to 3 servings. This represented an increase from the treatment phase, indicating that treatment effects were improved at follow-up.

Second, YB's participation in recess was targeted. YB was determined to be participating in recess when, "YB is engaged in moderate to vigorous activity (e.g., hula hoop, running, jump rope)." Because the amount of recess time varied daily (range 15-180 minutes), a percentage of the number of minutes that YB was engaged in moderate to vigorous activity at recess was calculated. At baseline, YB participated in an average of 13.67% (*SD* = 0.08) of recess, with a range from 0.00% to 33.3%. During treatment, YB improved her activity at recess to an average of 43.33% (*SD* = 0.10), ranging from 33.3% to 53.3%. In addition, there was only one overlapping data point, resulting in a PAND of 96.3% (i.e., 46.3% beyond chance). Visual inspection revealed an immediate and substantial change in level from baseline to treatment. Visual inspection techniques

utilizing structured criteria using CDC also revealed a substantial treatment effect. At 23 weeks follow-up, YB participated in an average of 100% of recess, representing an increase from treatment. As a result, data indicated that treatment effects continued to increase over time.

To evaluate the application of the intervention to two health behaviors in tandem, multiple baseline data across physical activity and dietary behaviors at school were evaluated using visual inspection. When the intervention was applied to fruit and vegetable intake, substantial improvements were evident; meanwhile, participation in recess remained at baseline levels. The application of the intervention to participation in recess also resulted in substantial improvements. In addition, there were few overlapping data points, resulting in a large PAND of 94.5% (i.e., 44.5% beyond chance). Therefore, analyses of the multiple-baseline design across behaviors demonstrated that improvements in health behaviors at school were due to the intervention and changes could not be attributed to extraneous variables.

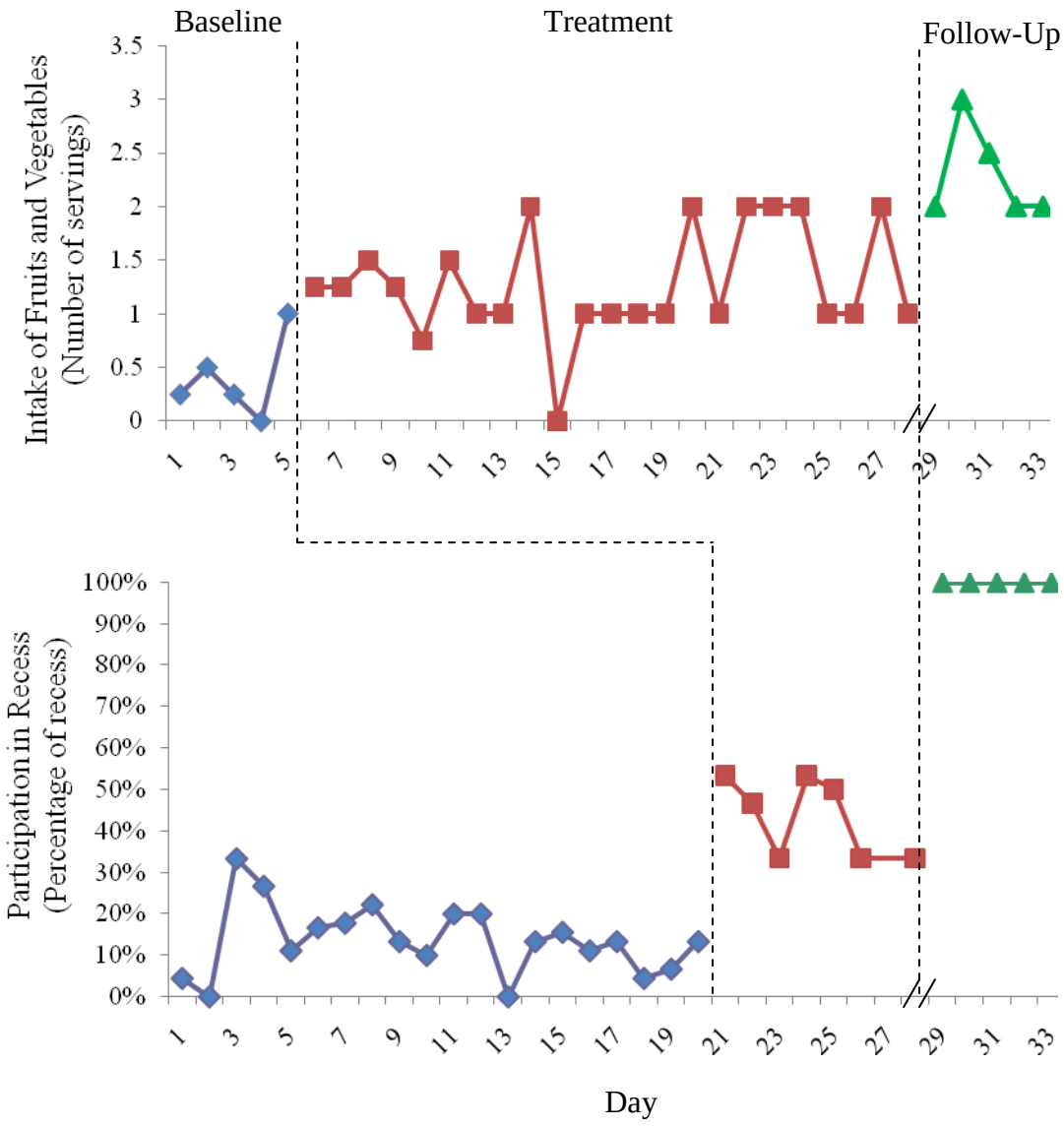

Figure 4. Multiple baseline graph for YB's individualized health behaviors at school.

Broad measures of health behaviors. YB completed the PAQ-C and DFR as broad measures of changes in her health behaviors. YB completed the PAQ-C every two weeks, including twice during the baseline phase and twice during treatment. YB's average mean item score was 3.14 at baseline and 3.72 at treatment. These data indicated

an increase in mean item score of 0.58 between baseline and treatment. This suggests an increase in physical activity from baseline to treatment as reported by YB. However, interpretation is limited due to the restricted number of data points.

YB's parents also completed the DFR to examine the proportion of healthy versus unhealthy foods consumed daily. Negative proportions indicate more unhealthy (i.e., red) foods than healthy (i.e., green) foods consumed, and positive proportions indicate more healthy (i.e., green) than unhealthy (i.e., red) foods consumed. During baseline, YB consumed a daily average of -0.14, with a range of -1.00 to 0.50. During treatment, YB consumed an average of -0.10, with a range of -1.00 to 1.00. These data indicated an increase in the proportion of green items to red items consumed. Visual inspection indicated no change in variability, trend, or level across baseline and treatment phases, and structured criteria using CDC indicated no substantial treatment effect. PAND was 83.7%, or 33.7% beyond chance level. These data indicate small treatment effects for DFR, a broad measure of daily food intake. DFR follow-up data were collected approximately 20 weeks after the last CPEI meeting. During follow-up, YB consumed a daily average of 0.40, with a range of -1.00 to 1.00. These data represent an increase in the proportion of green foods to red foods consumed from treatment to follow-up, indicating that treatment effects of overall dietary intake were improved over time.

AN

Individualized health behaviors at home. For AN, the team determined that physical activity was the primary concern that should be addressed first. The physical activity target behavior chosen at home was *moderate to vigorous activity*. Moderate to vigorous activity was determined to be when "AN is engaging in activity in which her

body is moving, she is breathing harder than at sitting, and her cheeks are flushed." The number of minutes AN was engaging in such activity was recorded daily. Overall during baseline, AN engaged in moderate to vigorous activity an average of 1.67 minutes (*SD* = 2.58) daily, with a range from 0 to 5 minutes. After initial implementation of the treatment program, AN's parents reported that AN engaged in 0 minutes of moderate to vigorous activity. As a result, the original plan was modified in response to the individual needs of AN and her family. In response to plan modifications, AN engaged in a total of 27.30 minutes (*SD* = 28.86) of moderate to vigorous activity daily during treatment, with a range of 0 to 60. Examination of changes in means across baseline to treatment conditions indicated an increase in moderate to vigorous activity. The PAND for moderate to vigorous activity was 75.0%, or 25.0% beyond chance level. Visual inspection indicated substantial improvements in AN's physical activity behavior after plan modifications were implemented. That is, there was not an immediate improvement in minutes of moderate to vigorous activity after initial treatment implementation, but changes were apparent in response to plan modifications. Furthermore, although data appeared stable during baseline, data became variable in the treatment phase. Data appeared to have a change in level across phases, and an increasing trend in the treatment phase was observed. The conservative dual criterion (CDC) indicated no substantial treatment effect. Overall, these data indicate modest treatment effects for moderate to vigorous activity at home. AN's family did not respond to requests to complete follow-up data.

The team then targeted sneaking snacks at home. *Sneaking snacks* was defined as "foods consumed by AN outside of scheduled meal times without previous permission

from her parents daily." It was recorded by number of snacks consumed daily, including those observed, reported by AN, or food packages found hidden in AN's bedroom, bathroom, or belongings. Baseline data indicated that AN sneaked an average of 1.25 snacks (*SD* = 0.50) daily, with a range of 1 to 2. During treatment, AN sneaked an average of 0.63 snacks (*SD* = 1.06) daily, with a range of 0 to 3. As a result, data indicated a reduction in the average number of snacks sneaked by AN daily. PAND for sneaked snacks was 83.3%, or 33.3% beyond chance level. However, visual inspection indicated a delay in treatment effects after the intervention program was introduced. Also, visual inspection indicated a change in level across phases and variable data. Structured criteria using CDC indicated substantial treatment effects. These data indicate moderate to high treatment effects for sneaking snacks at home.

To examine the effect of the intervention program on both home individualized target behaviors, visual analyses of the multiple baseline data were conducted. Visual analyses revealed baseline data for sneaking snacks did not demonstrate a substantial change in stability, level, or trend as treatment was initiated for moderate to vigorous activity. However, the introduction of treatment for moderate to vigorous activity did not result in immediate improvements corresponding with the change in phase. Furthermore, the introduction of treatment did not result in immediate improvements in sneaking snacks. The overall percentage of all nonoverlapping data (PAND) was 75.0%, or 25.0% beyond chance level. Overall, data were inconclusive if the treatment was solely responsible for changes in the health behaviors at home as opposed to extraneous variables.

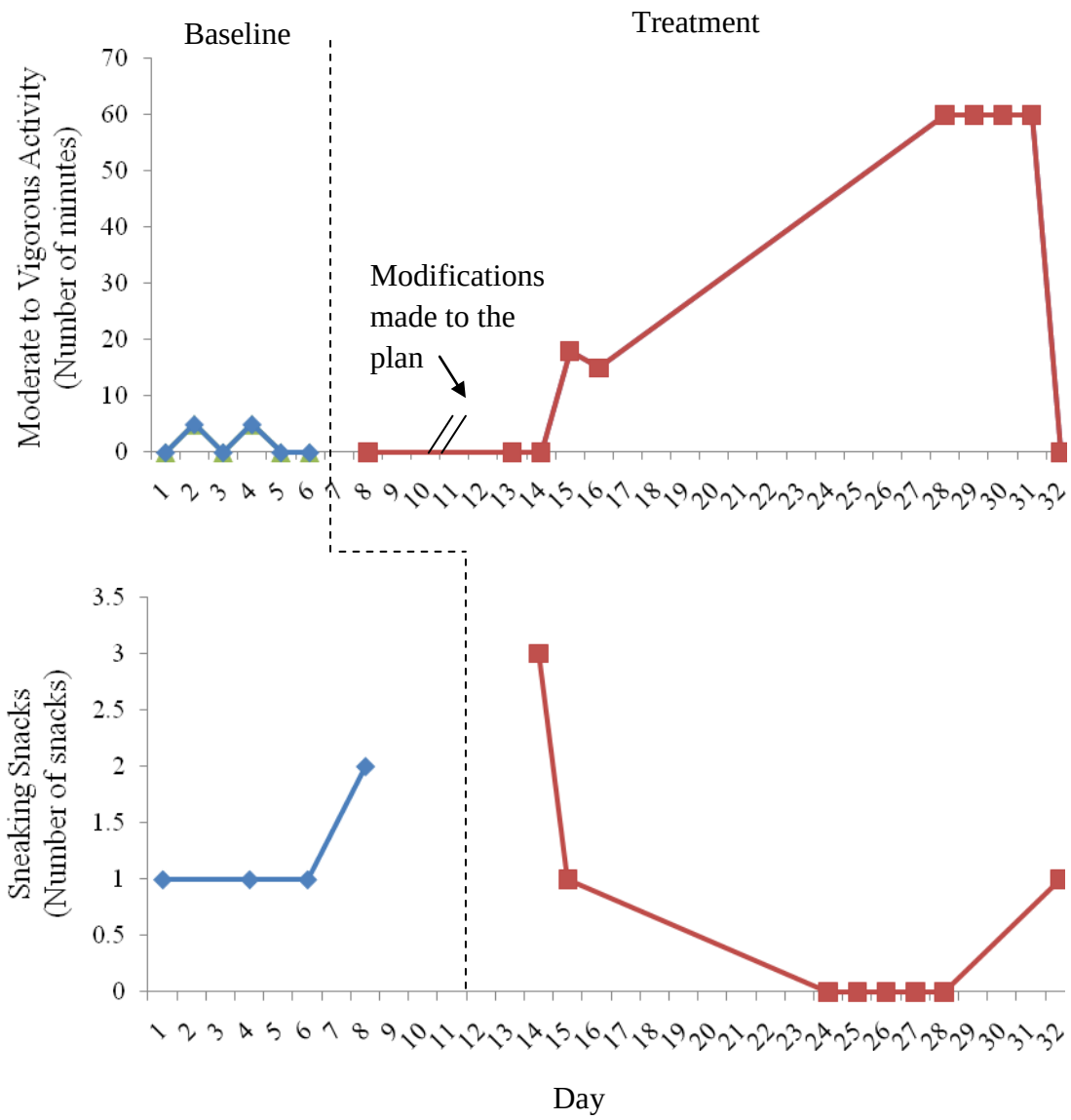

Figure 5. Multiple baseline graph for AN's individualized health behaviors at home.

Individualized health behaviors at school. At school, the team targeted *participation in P.E. class* first. Participation in P.E. class was defined as "during P.E. class, AN is engaged in moderate to vigorous activity (e.g., playing basketball, running, kicking)." It was recorded via momentary time sampling every 5 minutes. During baseline, AN participated in P.E. an average of 0.00% of observation samples. During

the treatment phase, AN participated in P.E. class an average of 48.89% (*SD* = 0.30) of observation intervals, ranging from 0.0% to 85.7%. Changes in the means across phases indicate an increase in participation in P.E. class from baseline to treatment. However, there were multiple days of missing data between phases due to poor data collection by AN's school personnel. The PAND for participation in P.E. was 90.0%, or 40.0% beyond chance level. Overall, visual inspection revealed a change in level and variability across phases, and structured criteria using the CDC indicated a substantial treatment effect. However, missing data points between phases made the immediacy of effect difficult to interpret. Collectively, these data indicated substantial treatment effects for participation in P.E. class at school. AN's school chose not collect follow-up data.

The team then targeted servings of fats, oils, and sweets consumed at school during lunch. *Fats, oils, and sweets intake* was defined as "servings of fats/oils/sweets (e.g., butter, fried foods, gravy, salad dressing, candy, sweet desserts, soda pop) consumed by AN daily." It was recorded by tallying the number of servings of fats, oils, and sweets consumed during school lunch. At baseline, AN consumed an average of 1.63 servings (*SD* = 0.60), with a range of 1.0 to 3.0. During treatment, AN consumed an average of 0.88 servings (*SD* = 0.93) daily, with a range of 0 to 2, indicating a reduction in the average number of servings of fats, oils, and sweets consumed by AN daily. PAND for intake of fats, oils, and sweets was 81.5%, or 31.5% beyond chance level. Visual inspection indicated an immediate change in level across phases. However, treatment data trended upward, indicating potential reduction in the effectiveness of the treatment over time. Structured criteria using CDC indicated no substantial treatment

effects. These data indicated moderate treatment effects for intake of fats, oils, and sweets at school.

To rule out the potential impact of extraneous variables, analyses of multiple baseline data across behaviors at school was examined. Visual analyses revealed baseline data for fats, oils, and sweets did not change in stability, level, or trend as treatment was initiated for participation in P.E. class. Second, the introduction of treatment for servings of fats, oils, and sweets did not change the stability, level, or trend of the treatment phase for participation in P.E. However, there are many missing data points between phases for physical activity at home, making the data difficult to interpret. Third, the introduction of treatment resulted in substantial improvements for participation in P.E. and intake of fats, oils, and sweets only when treatment was initiated. Further analyses revealed that the PAND was 83.8%, or 33.8% beyond chance level. Therefore, these data indicated that the treatment was responsible for the improvements in the individualized dietary and physical activity behaviors at school as opposed to extraneous variables.

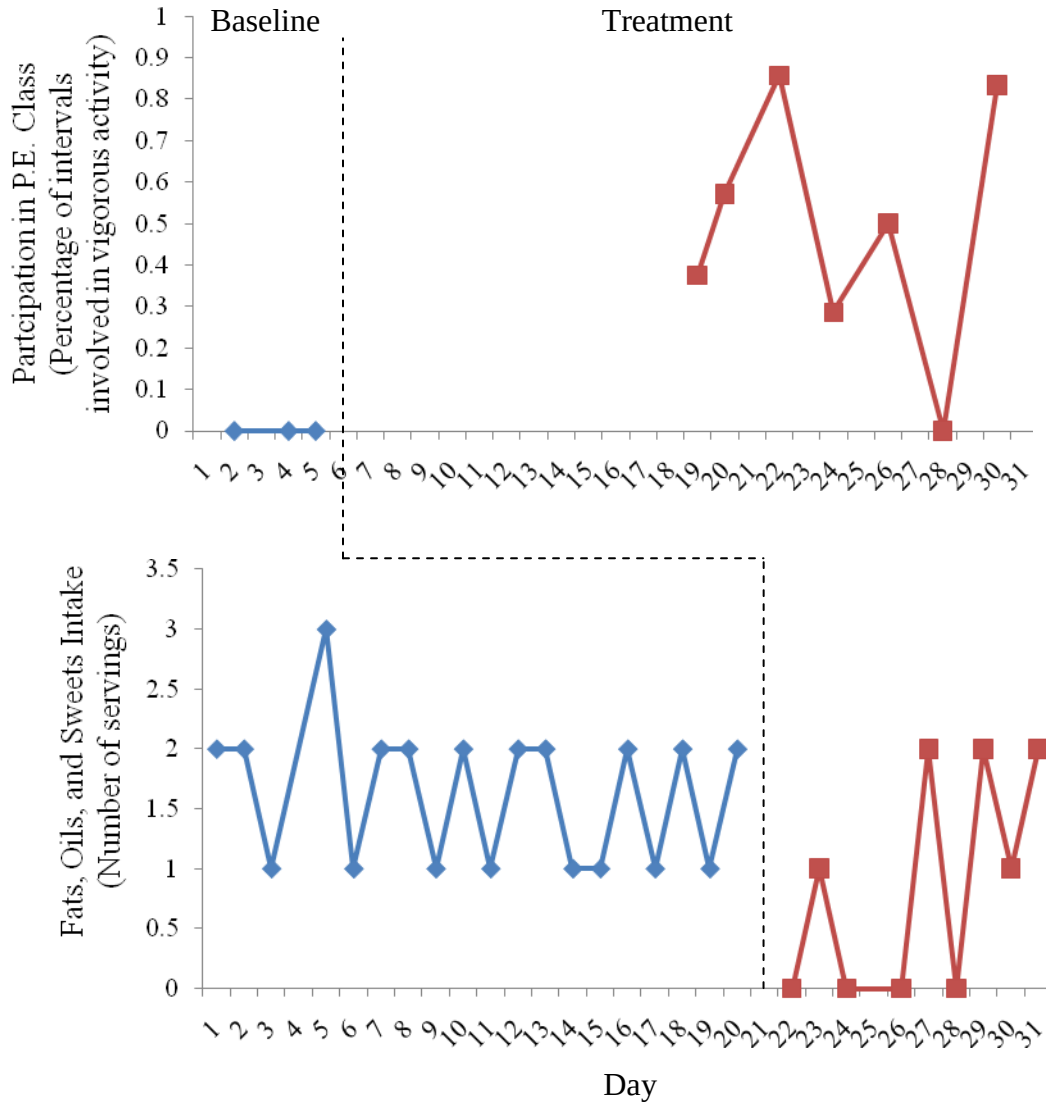

Figure 6. Multiple baseline graph for AN's individualized health behaviors at school.

Broad measures of health behaviors. AN completed the PAQ-C measure once prior (i.e., baseline) and every two weeks after CBC intervention implementation. At baseline, AN's mean item score was 2.00. Her average item score increased to 2.41 during treatment, indicating an increase in mean item score of 0.41 between baseline and treatment. This suggests a slight increase in physical activity from baseline to treatment.

Visual inspection and PAND could not be calculated due to a limited number of baseline data points.

The DFR was completed by AN's parents as a proxy for overall food intake. Negative scores indicate that AN consumed more red foods than green foods, and positive scores indicate more green foods than red foods consumed. During baseline, AN consumed a daily average of 0.03 (range of -0.45 to 0.43), indicating slightly more green foods than red foods consumed. During treatment, AN consumed an average of 0.11 (range of -0.40 to 0.75), indicating a slight increase in the proportion of green items to red items consumed. Visual inspection indicated no clear change in level across phases. However, an increasing trend was evident in the treatment phase suggesting an increasing trend of consuming healthy foods during treatment. Structured criteria using CDC indicated no treatment effect. PAND was 76.2%, or 26.2% beyond chance level. These data indicate small treatment effects for daily food intake. AN's parents chose not to collect follow-up data.

TO

Individualized health behaviors at home. TO's team decided to develop a plan to address dietary behaviors at home first. Specifically, *snacking*, or "food consumed by TO outside of scheduled meal times," was tallied daily. Information was collected regarding the number of red and green snacks consumed (based on Traffic Light Diet classifications). During baseline, TO consumed a daily average of -0.44 (*SD* = 0.51), ranging from -1.00 to 0.00, indicating more red foods than green foods consumed. During treatment, TO consumed an average of 0.50 (*SD* = 0.58), ranging from 0.00 to 1.00, indicating more green than red items consumed. These data indicate an increase in

the proportion of green items to red snacks consumed. During plan implementation for snacking, TO's mother withdrew from the study. As a result, data collection was severely restricted. Visual inspection indicated a decreasing trend in the proportion of green snacks consumed during baseline. There appeared to be an immediate change in level toward more green than red snacks consumed from baseline to treatment phases. Treatment data appeared to have a stable pattern with no clear trend. The conservative dual criterion (CDC) indicated a substantial treatment effect. The percentage of all nonoverlapping data (PAND) was 85.7%, or 35.7% beyond chance level. Overall, these data indicated substantial treatment effects for snacking at home. However, interpretations of analyses are limited due to a restricted number of data points (i.e., 3 baseline, 3 treatment).

TO's mother withdrew from this study prior the treatment phase for the physical activity behavior. As a result, no intervention was implemented for moderate to vigorous activity at home and analyses could not be interpreted across the multiple baseline graphs due to the limited data available.

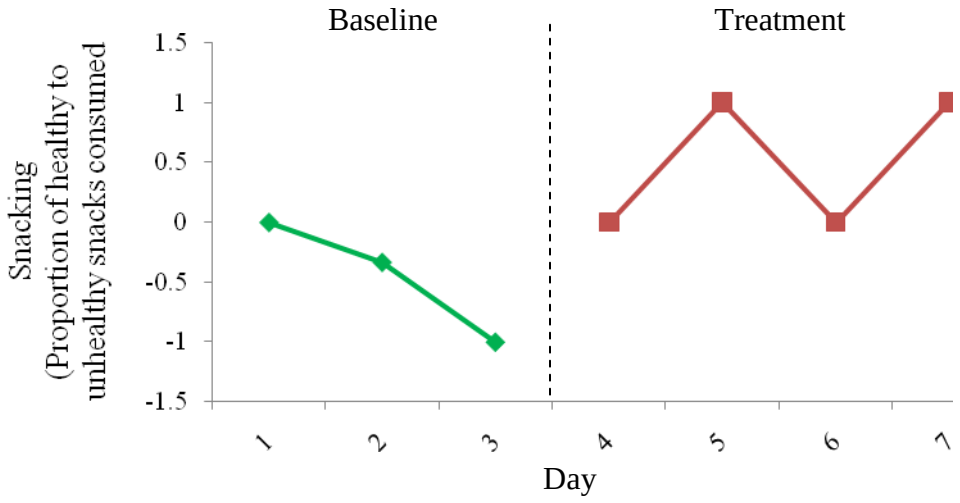

Figure 7. Graph of TO's dietary behavior at home.

Individualized health behaviors at school. Although TO's mother withdrew from the study, CBC procedures were carried out with TO's nurse at her school. *Sneaking snacks*, defined as "foods or food wrappers found hidden in TO's possessions (e.g., backback, desk) at school," was addressed first. TO's teacher recorded the number of food wrappers or containers hidden by TO daily. TO sneaked an average of 1.00 (*SD* = 0.82) snack daily (range 0 to 2) during baseline and 0.07 (*SD* = 0.26) snacks during treatment (range 0 to 1). Visual analyses show that baseline data were variable with no clear trend and treatment data were stable and had no trend. Across phases, visual inspection also revealed an immediate change in level and variability, with snacking decreasing and becoming more stable in the treatment phase. The PAND was 89.5%, or 39.5% beyond chance level. Visual inspection with structured criteria using the CDC indicated a substantial treatment effect. Collectively, these data indicated substantial treatment effects for sneaking snacks at school. Follow-up data collected approximately 18 weeks after the final CPEI revealed that TO was sneaking an average of 0.4 snacks daily, with a range from 0 to 1. These data indicated a reduction in treatment effects at follow-up.

The consultant and the school nurse then targeted *participation at recess*, defined as "during recess, TO is engaged in moderate to vigorous activity (e.g., running, jumping, skipping)." Participation in recess was recorded by timing the number of minutes TO was engaged in moderate to vigorous activity (e.g., running, jumping, skipping). At baseline, data indicated that TO participated in an average of 3.67 minutes (*SD* = 3.32) at recess, with a range of 0.00 to 9.00 minutes. During treatment, TO participated in an

average of 12.30 minutes (*SD* = 5.62) daily, with a range of 3.00 to 16.50, indicating an increase in the average number of minutes TO participated in recess. The PAND for participation at recess was 92.9%, or 42.9% beyond chance level. Visual inspection indicated that the baseline data were variable with a decreasing trend and treatment data were variable with no trend. Across phases, visual inspection indicated variable data with a delayed change in level, as the first treatment data point did not significantly differ from baseline. However, all other treatment data appeared to display a change in trend from low to high number of minutes of participation in recess. Structured criteria using CDC indicated no substantial treatment effects. These data indicate substantial treatment effects for participation in recess at school. Follow-up data indicated that TO participated in an average of 1.25 minutes (*SD* = 0.50) at recess (range 1.00 to 2.00), representing a reduction in treatment effects over time.

Visual analyses of multiple baseline data across behaviors at school indicated that the introduction of treatment resulted in substantial improvements for sneaking snacks and participation in recess when treatment was initiated. Baseline data for participation in recess appeared to change in level as treatment was initiated for sneaking snacks. However, the number of minutes TO participated in recess decreased as treatment was initiated for sneaking snacks, indicating no mirroring of effects across behaviors. Furthermore, the introduction of treatment for participation in recess did not significantly alter the stability, level, or trend of the treatment phase for sneaking snacks. The overall PAND was 91.9%, or 41.9% beyond chance level. Overall, it appears that the treatment was responsible for the improvements in the individualized dietary and physical activity

behaviors at school as opposed to extraneous variables; however, these improvements were not maintained over time.

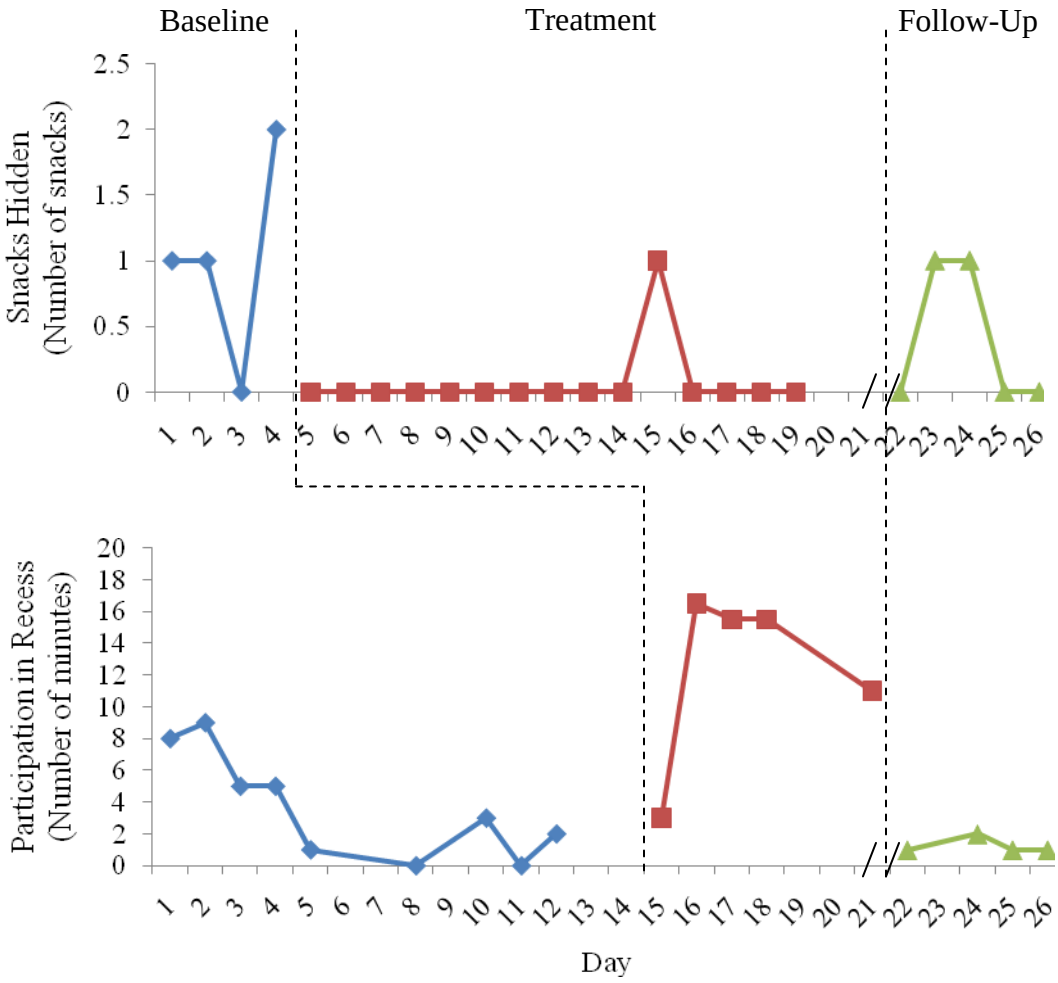

Figure 8. Multiple baseline graph for TO's individualized health behaviors at school.

Broad measures of health behaviors. TO completed the PAQ-C to evaluate overall changes in physical activity only once during baseline and once during the treatment phase. TO's average mean item score was 3.21 at baseline and 3.36 at treatment. These data indicated a minor increase in the mean item score of 0.15 between baseline and treatment. This suggests relatively stable physical activity from baseline to

treatment as reported by TO. However, data analyses are limited due to the restricted number of data points.

Prior to withdrawing from the study, TO's mother completed the DFR to examine the proportion of healthy versus unhealthy foods consumed daily. Negative proportions indicate more unhealthy (i.e., red) foods than healthy (i.e., green) foods consumed, and positive proportions indicate more healthy (i.e., green) than unhealthy (i.e., red) foods consumed. During baseline, TO's average daily proportion of healthy to unhealthy foods was -0.08, with a range of -0.60 to 0.60. During treatment, TO's average proportion was 0.51, with a range of 0.00 to 1.00. These data indicated an increase in the proportion of green items to red items consumed. Visual inspection indicated that baseline data were variable with no trend, and treatment data were variable with a slight decreasing trend. Across phases, visual inspection indicated a change in level from baseline to treatment. CDC for visual inspection indicated no substantial treatment effect. PAND was 81.8%, or 31.8% beyond chance level. Overall, these data indicated moderate treatment effects. No follow-up data were collected.

Health Status

Height and weight were measured every two weeks throughout the CBC process to calculate each child's BMI. This usually resulted in one baseline measurement and several treatment measurements. Due to the limited number of baseline data points for BMI measurements, visual inspection and PAND could not be calculated. Therefore, the significance of changes in BMI over time could not be detected and data are purely descriptive. The American Academy of Pediatrics recommends a general goal is for BMI to be below the 85th percentile (Spear et al., 2007). Furthermore, the recommended

weight loss for children 6 to 11 years of age with a BMI from the 95th to 98th percentile is approximately 1 pound per month. For those children ages 6 to 11 with a BMI above the 95th percentile, weight loss should not average more than 2 pounds weekly (Spear et al., 2007). Data are summarized in Table 10.

Table 10

Summary of Health Status (BMI) Data

Child	Baseline	Treatment Mean	Follow-Up	Reduction in BMI
BR	29.5	28.1	28.4	Yes
YB	28.1	27.5	19.2	Yes
AN	40.9	41.4	NA	No
TO	42.0	41.2	44.5	No

BR

During baseline, BR's BMI was above the 95th percentile at 29.5 (i.e., 134 pounds, 56.5 inches). A BMI at the 50th percentile for an 8 year old girl is approximately 16. During the treatment phase, BR's BMI was measured at 27.9 (i.e., 129 pounds, 57 inches), 27.9 (i.e., 129 pounds, 57 inches), 27.9 (i.e., 129 pounds, 57 inches), and 28.5 (i.e., 132 pounds, 57 inches) at consecutive measurements, for an average of 28.1. This indicated a decrease in BR's BMI from baseline through the treatment phase. BR's weight loss followed the American Academy of Pediatric's recommendations of approximately 1 pound of weight loss per month. At follow-up, 17 weeks after the final CPEI, BR's BMI was measured at 28.4 (i.e., 136 pounds, 58 inches). These data indicate that BR had maintained her BMI over time, even after ending the CBC process. However, BR's BMI remained above the 95th percentile throughout all treatment phases.

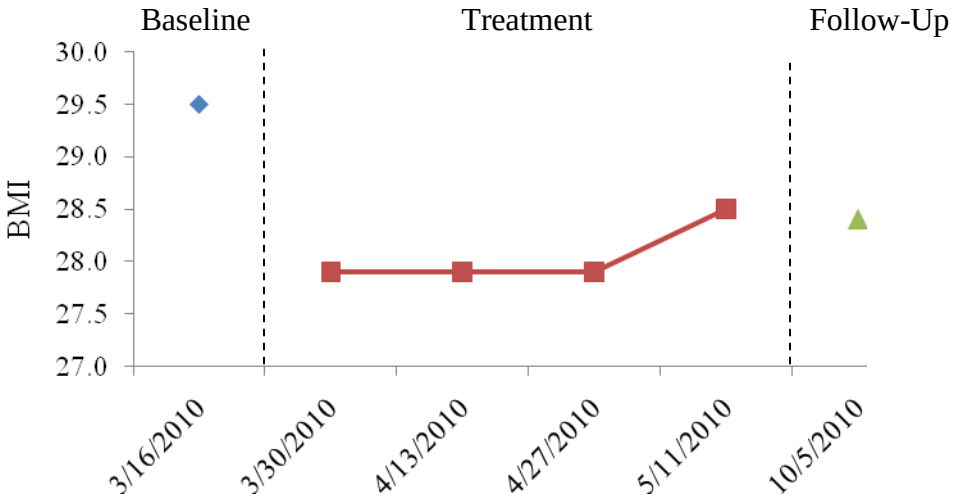

Figure 9. Graph of BR's BMI scores at baseline, treatment, and follow-up.

YB

At baseline, YB's BMI was above the 95th percentile at 28.1 (i.e., 123.7 pounds, 55.6 inches). A BMI at the 50th percentile for a 7 year old girl is approximately 15.6. Her treatment measurements were stable at 27.5 (i.e., 121 pounds, 55.6 inches) and 27.5 (i.e., 121 pounds, 55.6 inches). Data from baseline to treatment phases indicated a reduction in YB's BMI following the initiation of treatment. YB's weight loss followed the American Academy of Pediatric's recommendations of approximately 1 pound of weight loss per month. A follow-up measurement was conducted 28 weeks after the final CPEI. YB's BMI at follow-up was 19.2 and fell to the 90th percentile. These data indicated that YB had continued reductions in her BMI over time, even after ending the CBC process.

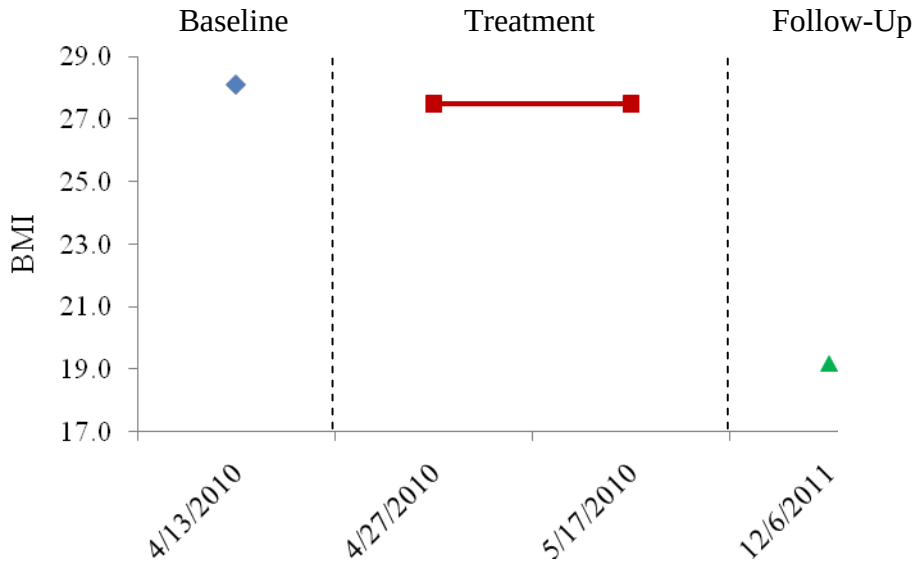

Figure 10. Graph of YB's BMI scores at baseline, treatment, and follow-up.

AN

The baseline measurement of AN's BMI was above the 95th percentile 40.9 (i.e., 227.5 pounds, 62.5 inches). A BMI at the 50th percentile for an 11 year old girl is approximately 17.6. Treatment phase data were stable at 41.4 (i.e., 230 pounds, 62.5 inches), 41.5 (i.e., 230.5 pounds, 62.5 inches), and 41.4 (i.e., 230 pounds, 62.5 inches), for an average of 41.4. As a result, AN's BMI increased from baseline to treatment phases. Follow-up data were not collected. Measurements were above the 95th percentile for AN's age and sex through baseline and treatment phases.

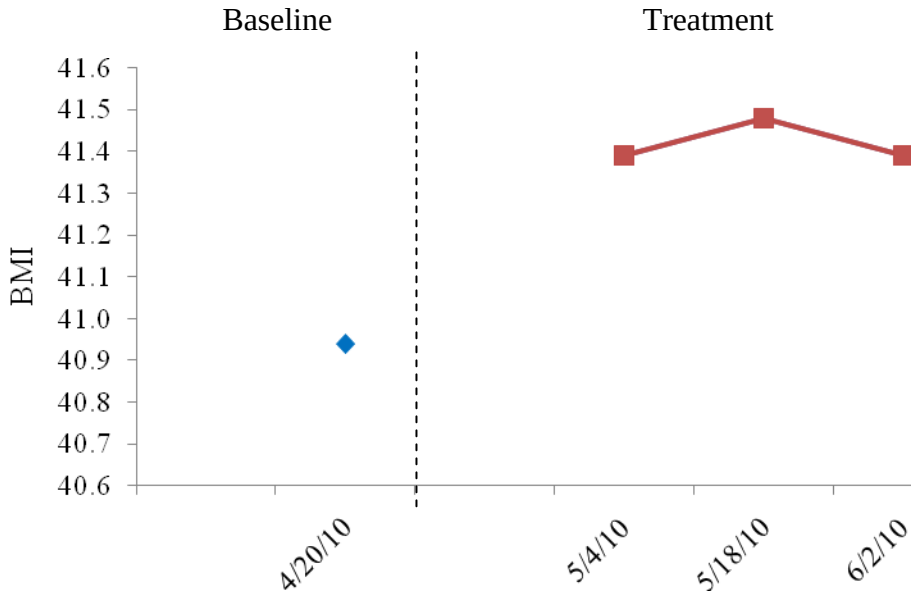

Figure 11. Graph of AN's BMI scores at baseline and treatment.

TO

TO had one baseline, two treatment measurements, and one follow-up measure of height and weight. TO's baseline measurements resulted in a BMI score above the 95th percentile at 42.0 (i.e., 174 pounds, 54 inches). A BMI at the 50th percentile for a 9 year

old girl is approximately 16.6. Treatment measurements of BMI were 41.0 (i.e., 169.5 pounds, 54 inches) and 41.4 (i.e., 169.8 pounds, 54 inches) with an average of 41.2, indicating a decrease in BMI from baseline to treatment measurements. TO's weight loss followed the American Academy of Pediatric's recommendations of approximately 4 to 8 pounds of weight loss (for children over the 99th percentile) during the first month. At follow-up, TO's BMI was 44.5, indicating an increase in BMI over time. BMI scores did not fall below the 95th percentile throughout the CBC process and follow-up.

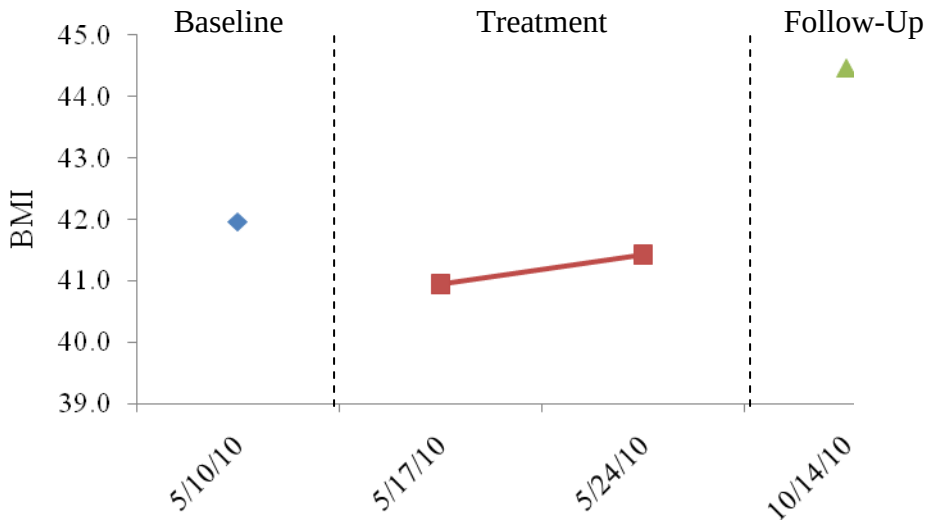

Figure 12. Graph of TO's BMI scores at baseline, treatment, and follow-up.

Treatment Integrity Data

CBC Integrity

The integrity with which the CBC interviews were conducted was assessed. CBC interviews were audio recorded and 30% of the interviews were assessed by two trained coders for adherence to interview objectives. One-third of those interviews were coded

by two raters and interrater reliability was calculated to be 96.7%. Overall, 97% of interview objectives were met, indicating high CBC integrity.

Implementation Integrity

Implementation integrity was assessed to understand the fidelity with which the participating families and school personnel implemented the health behavior intervention as designed. Implementation integrity data are summarized in Tables 11 and 12. Health status outcome data are also reported in conjunction with integrity data in Tables 11 and 12 to reflect correspondence between implementation and outcomes. This information is purely illustrative and is meant to provide a parsimonious description of the two variables. Correlations could not be calculated due to the small n study design.

Table 11

Implementation Integrity and Summary of Health Status Outcomes at Home

Child	Behavior	Treatment Integrity	Reduction in BMI
BR	Biking/Walking	89.2%	Yes
	Vegetable Intake	91.7%	
YB	Snacking	97.3%	Yes
	Moderate to Vigorous Activity	NA	
AN	Moderate to Vigorous Activity	40.5%	No
	Sneaking Snacks	35.1%	
TO	Snacking	21.6%	No

Table 12

Implementation Integrity and Summary of Health Status Outcomes at School

Child	Behavior	Treatment Integrity	Reduction in BMI
BR	Participation in P.E.	94.1%	Yes
	Vegetable Intake	100.0%	
YB	Fruit and Vegetable Intake	97.5%	Yes
	Participation in Recess	39.3%	
AN	Participation in P.E. Class	48.4%	No
	Fats, oils, and sweets intake	43.5%	
TO	Sneaking snacks	62.2%	No
	Participation at recess	75.0%	

BR. BR's intervention plans for physical activity and dietary behaviors at home were each divided into four individualized plan steps. BR's mother indicated whether or not she implemented each plan step daily. BR's mother completed treatment integrity forms for 80.9% of total plan steps across all days of treatment implementation. Of the data that were collected, BR's mother reported completing 89.2% of the home plan steps

for the physical activity behavior and 91.7% for the dietary behavior (excluding steps that were not applicable). This indicated a high level of implementation integrity at home.

At school, BR's physical activity plan was depicted in five plan steps and her dietary plan was depicted in four plan steps. BR's school counselor indicated whether or not she implemented each plan step daily. She completed treatment integrity forms for 99.5% of all plan steps. For data that were collected, BR's school counselor reported executing 94.1% of all school plan steps for the physical activity behavior and 100.0% of dietary behavior plan steps (excluding steps that were not applicable). Data indicated a high level of implementation integrity at school.

YB. YB's parents completed integrity assessment forms at home by indicating if they implemented each of 4 plan steps for the dietary behavior. YB's parents completed treatment integrity forms for 70.8% of the dietary behavior plan steps. Of the data that were collected, 97.3% of the home plan steps (excluding steps that were not applicable) were executed. YB's parents did not collect treatment implementation forms for the physical activity behavior. Overall, data collected indicated a high level of implementation integrity at home.

At school, YB's dietary and physical activity plans were depicted in four plan steps each. School personnel at YB's school indicated whether or not each plan step was implemented daily on treatment integrity forms. The proportion of plan steps on treatment integrity forms completed was 98.8%. For data that were collected, YB's school personnel reported executing 97.5% of dietary plan steps and 39.3% of physical activity plan steps (excluding steps that were not applicable). Data indicated a high level of implementation integrity for the dietary plan at school.

AN. At home, AN's family completed treatment integrity forms for four physical activity plan steps and three dietary plan steps. AN's parents completed treatment integrity forms for 65.8% of all plan steps. Of data that were collected, they reported implementing 40.5% of physical activity plan steps and 35.1% of dietary plan steps. Overall, AN's parents had a poor level of treatment implementation integrity at home.

AN's teacher completed integrity forms for four physical activity and three dietary plan steps at school. The total proportion of plan steps on treatment integrity forms completed by AN's teacher was 32.0%. Of the data completed, she reported carrying out 48.4% of the physical activity plan steps and 43.5% of dietary plan steps (excluding steps that were not applicable). This indicates poor implementation of treatment plan steps at school.

TO. Prior to withdrawing from the study, TO's mother implemented a dietary plan for 13 days. The dietary plan at home was divided into four individualized plan steps. TO's mother completed treatment integrity forms for 91.1% of dietary plans steps. Of the data that were collected, TO's mother reported completing 21.6% of the home plan steps (excluding steps that were not applicable). This indicated a poor level of implementation integrity at home.

At school, TO's physical activity plan was depicted in four plan steps and her dietary plan was depicted in five plan steps. TO's school nurse indicated whether or not she implemented each plan step daily. She completed treatment integrity forms for 59.8% of all plan steps. For data that were collected at school, TO's school nurse reported executing 62.2% of dietary plan steps and 75.0% of physical activity plan steps. Data indicated a poor level of implementation integrity at school.

Social Validity

Perceptions of the acceptability and efficacy of the CBC process and health behavior interventions was assessed after completion of CBC by participating children, families and school personnel via the *CIRP* and *BIRS-R*, respectively. Families and school personnel also rated the degree to which they perceived that each child's individualized physical activity and dietary behavior goals (identified during CPAI stage of CBC) were met. The *GAS* was completed by families and school personnel weekly during plan implementation. Mean item ratings for social validity measures for each child are summarized in Tables 13 and 14.

Table 13

CIRP and BIRS-R Social Validity Outcomes

	CIRP[1]	BIRS-R[2] Parent				BIRS-R School Personnel			
Child	Total	Acceptability	Effectiveness	Time to Effect	Total	Acceptability	Effectiveness	Time to Effect	Total
BR	1.43	1.33	1.71	2.50	1.54	1.57	2.60	2.50	1.90
YB	1.57	1.67	1.86	2.00	1.75	1.13	1.86	1.00	1.33
TO	NA	NA	NA	NA	NA	NA	NA	NA	NA
AN	1.71	2.07	3.00	3.50	2.46	1.33	2.43	2.43	1.71
Averages:	1.57	1.69	2.19	2.67	1.92	1.34	2.30	1.98	1.65

[1] *CIRP* scores represent child average item scores, with possible scores ranging from 1 (high perceived acceptability) to 5 (low perceived acceptability).

[2] BIRS-R scores represent parent and school personnel average item scores, with possible scores ranging from 1 (high perceived efficacy) to 6 (low perceived efficacy).

NA = Data not available

Table 14

GAS Social Validity Outcomes

Child	GAS[1] Home		GAS School	
	Physical Activity Behavior	Dietary Behavior	Physical Activity Behavior	Dietary Behavior
BR	2.9	2.0	2.0	1.7
YB	NA	1.3	NA	2.0
TO	NA	2.0	2.5	3.0
AN	2.0	2.0	2.0	1.0
Averages:	2.5	1.8	2.2	1.9

[1] GAS scores represent parent and teacher average perception of child attainment of health behavior goals on a scale from -3 (situation got significantly worse) to +3 (goal completely met). NA = Data not available

CHAPTER 4

DISCUSSION

The purpose of this study was to evaluate the efficacy of Conjoint Behavioral Consultation (CBC) in improving the health behaviors and health status of children with obesity. Specific research questions were: Is CBC effective for (a) increasing healthy dietary and physical activity behaviors of children with obesity? and (b) improving the health status of children with obesity? The efficacy of the intervention was assessed utilizing a multiple baseline design across dietary and physical activity behaviors for each child. The efficacy of the health behavior intervention was assessed via its effects on measures of dietary and physical activity behaviors (i.e., direct behavioral observations, Physical Activity Questionnaire for Children, the Daily Food Report) and body mass index (BMI) of each child participant. Additionally, caregiver, school personnel, and child perceptions were assessed to evaluate social validity of the intervention. It was hypothesized that CBC would be effective for increasing the dietary and physical activity behaviors of children with obesity as well as improving their BMI.

Summary of Outcomes

Health Behaviors

Results for the first research question examining the effect of CBC for increasing healthy dietary and physical activity behaviors of children with obesity were mixed, but promising. Although outcomes for some participants in some settings supported the effectiveness of CBC for health behaviors, other outcomes suggest the need for future research prior to making conclusions about the effectiveness of CBC. Specifically, outcomes of the CBC intervention package for the individualized physical activity and

dietary behaviors for children were effective for YB's individualized health behaviors at home and school as well as AN and TO's individualized health behaviors at school. That is, visual analyses of multiple baseline data revealed improved mean level changes across phases (using visual inspection with structured criteria) without affecting the health behavior still in the baseline phase and high percentages of all nonoverlapping data (PAND). Furthermore, outcomes for broad measures of health behaviors (i.e., PAQ-C, DFR) indicated small overall improvements in broad health behaviors for all participants with respect to mean level changes across phases (using structured criteria) and PAND.

However, three outcomes related to the first research question revealed uncertain efficacy of CBC. First, the research design did not allow for clear interpretation of BR's behavior changes. The intervention resulted in substantial improvements in BR's physical activity behaviors at home; however, the dietary behavior (e.g., vegetable intake) was not substantially affected. As a result, it is unclear if the lack of substantial change in vegetable intake is a reflection of the target behavior chosen, measurement procedures, or specific intervention strategies used for that target behavior.

Second, although overall modest treatment effects were observed for AN's physical activity behavior at home, the introduction of treatment did not result in *immediate* improvements in physical activity. Once data revealed no improvements in response to the initial plan strategies, modifications were made to the plan in response to the individual needs of the family. Improvements in AN's physical activity behavior were reported in response to plan changes. As a result, substantial changes in physical activity were not observed in the data until after plan modifications. Eventual

improvements were observed in both health behaviors in response to the treatment plan for AN.

Third, TO's mother withdrew from the study during the plan implementation phase for the first target behavior (i.e., dietary behavior). Therefore, only baseline data were collected for the physical activity behavior, and analyses could not be interpreted across the multiple baseline graphs for TO's home target behaviors.

Of the follow-up data that were collected, results were mixed. Overall, the individualized health behaviors of child participants that had substantial improvements during the treatment phase maintained those effects over time, with the exception of TO's health behaviors at school. For those participants who collected follow-up data regarding broad dietary behavior (i.e., BR and YB), continued effects for overall daily food intake were reported over time.

Overall, immediate and follow-up findings are promising for the efficacy of CBC for increasing healthy dietary and physical activity behaviors of children with obesity. Findings indicate that CBC can be applied to behaviors beyond academic, behavior, and social concerns and may be effective for the improvement of health behaviors. The collaboration involved in CBC may also result in improved child health behavior outcomes in both home and school settings. Although results were the most substantial for health behaviors individualized for each child participant, the data also suggested that broad physical activity and dietary habits were affected to a smaller extent, indicating that changing specific problem health behaviors may generalize to overall healthy lifestyle. It appeared that non-significant outcomes were more likely due to clinical considerations (e.g., plan modifications, withdrawal of study participants, and selection of target

behavior) and design limitations (e.g., self-report measurement procedures) that should be addressed in future research and practice than due to the fundamental effectiveness of CBC. However, the exact explanation of the mixed findings is unclear and should be investigated further.

Outcomes related to the first research question substantiate and build upon previous literature reporting the effectiveness of family- and school- based interventions for children with obesity as well as studies investigating the value of CBC. The improvements in health behaviors of the child participants are paralleled in other research studies, including family-based treatment programs (Epstein et al., 2004) and school-based prevention programs (Cook-Cottone et al., 2009; Gortmaker et al., 1999; Himes et al., 2003; Marcus et al., 2009; Sharma, 2006). Additionally, this study is similar to studies identifying the effectiveness of CBC to improve child academic, behavioral, and social concerns across home and school (Colton & Sheridan, 1998; Galloway & Sheridan, 1994; Gortmaker, Warnes, & Sheridan, 2004; Sheridan, Eagle, Cowan, & Mickelson, 2001; Weiner, Sheridan, & Jenson, 1998), and validates one previous study that identified CBC as a beneficial program to address health behaviors of children (Lasecki et al., 2008).

Treatment effectiveness for health behaviors should be interpreted with caution for several reasons. There are multiple limitations related to child health behavior outcomes. First, there were multiple missing data points for AN, resulting in gaps in data during treatment implementation. Missing data were due to inconsistent data collection by AN's parents and teacher. Missing data may result in a misrepresentation of the data that were reported (e.g., only reporting data on days the intervention was implemented).

Also, data was missing between phases for physical activity at school for AN, which may allow for the influence of confounding variables, making it difficult to interpret the multiple baseline design. Second, TO's mother chose to withdraw from the study during treatment implementation for the first individualized health behavior. TO's mother reported that she chose to withdraw from the study due to lack of time to implement treatment recommendations. This may represent an inherent weakness of time commitment needed to engage in CBC procedures. Additionally, it is unclear if CBC would have resulted in an improvement in TO's health behaviors at home, had the intervention been implemented in that environment. It is also unclear whether the lack of a home component during the remainder of CBC affected school procedures or outcomes. Third, results for each participant may be a reflection of the specific target behaviors chosen and not solely due to the effectiveness of the program. For example, some target behaviors are more amenable to change (e.g., minutes of vigorous activity) than other target behaviors (e.g., number of snacks stolen).

Health Status

The second research question investigated the effectiveness of CBC for improving the health status of children with obesity. In general, the results of this study indicate mixed effectiveness of CBC for the health status of children with obesity. Outcomes that supported the effectiveness of CBC for improving health status were observed for BR and YB, who demonstrated a reduction in BMI from baseline to treatment phases. However, TO's BMI remained relatively stable and AN's BMI increased over the course of the treatment.

Follow-up data that were collected appeared mixed. For BR and YB, improvements in BMI made during the treatment phase were maintained or continued over time. In fact, YB's BMI reduced from over the 95th percentile to the 90th percentile during follow-up. YB was the only participant whose BMI dropped below the 95th percentile during the course of this study. However, TO's BMI increased at follow-up. This finding is not surprising, as the follow-up period occurred over the summer months, when TO was on summer break from school. Since TO's mother had withdrawn from the study, intervention plan procedures were likely not implemented in the home setting over the follow-up time period, resulting in no expected improvements in TO's BMI over the follow-up period.

Overall, it is unclear if CBC is effective for improving the health status of children with obesity. Although half of the participants had improvements in BMI during the treatment implementation phase and at follow-up, half of the participants had no improvement in BMI. It appeared that participants who had higher BMI's (i.e., >40) did not improve their health status during this study. Future studies should investigate if CBC is more effective for children with lower BMI scores, perhaps CBC is more effective for children who are overweight or between the 80th to 95th percentiles for BMI. Also, findings indicated that short-term CBC is more effective for health behaviors than for overall health status. It may be that changes in health behaviors represent an immediate response to intervention procedures, and changes in health status are reflective of a long-term outcome. That is, CBC procedures for health behaviors of children with obesity are too brief to observe relatively short-term changes in health status and future

studies should attempt to lengthen treatment procedures and measure long-term BMI outcomes.

Outcomes of this study are contrary to previous research reporting the effectiveness of family-based treatments for the health status of children with obesity (Golan et al., 1998; Kalarchian et al., 2009; Kalavainen et al., 2007; Nemet et al., 2005; Vignolo et al., 2008). However, outcomes are similar to studies of school-based interventions in which health status outcomes are mixed (Campbell et al., 2001; Cook-Cottone et al., 2009; Doak et al., 2006; Pyle et al., 2006; Sharma, 2006). Most family-based treatments lasted 6 months or longer (with the exception of a 3 month treatment implemented by Nemet et al., 2005), and Cook-Cottone and colleagues (2009) found that the most effective school-based intervention programs were longer in duration. This lends support to extending the length of the CBC treatment in future studies to potentially improve health status outcomes of child participants. Also, the inconsistent maintenance of health status changes beyond treatment termination found in this study is similar to previous literature on follow-up of intervention programs for children with obesity (Edwards et al., 2006; Epstein et al., 2000a; Golan & Crow, 2004; Hoelscher et al., 2004; Kalavainen et al., 2007; Nemet et al., 2005; Vignolo et al., 2008).

Limitations were present when investigating health status, and outcomes should be interpreted with caution, particularly for TO's outcome data. TO's mother chose to withdraw from the study during treatment implementation for the first individualized health behavior. As a result, the treatment plan was no longer implemented at home and the CBC procedures were limited to the school setting. The reduction of CBC to one setting may have impacted outcomes for TO's health status. Also, when treatment

implementation procedures were withdrawn from school due to summer break, TO did not receive any treatment components prior to her follow-up measurement. As a result, her follow-up data should be interpreted with caution. Limitations are also present with measuring BMI (see limitations section below).

Treatment Integrity

Treatment integrity data were collected to investigate if participating families and school personnel implemented the health behavior intervention package consistently and accurately. Health behavior intervention integrity data varied across participants and settings. For the data collected, parents and school personnel working with BR and YB reported the highest intervention implementation integrity. Specifically, BR's mother and school counselor reported high integrity across settings (i.e., over 90% of plan steps). YB's parents also reported high integrity (i.e., 97.4% of plan steps) and YB's school had moderate integrity (i.e., 72.5% of plan steps). For the data collected for AN and TO, low intervention implementation integrity was reported. Specifically, AN's parents and school personnel reported low intervention implementation integrity (i.e., 37.0% and 46.3% of plan steps, respectively). During the time that TO's mother participated in the study, her integrity was also low (i.e., 21.6% of plan steps). TO's school nurse had low to moderate intervention implementation integrity (i.e., 67.1% of plan steps).

In general, data indicated that child participants whose family and school personnel had low intervention implementation integrity also had poorer health status outcomes. This was not systematically investigated in this study, however, due to the small sample size, so precise correlations could not be calculated. Nevertheless, this trend is congruent with other research on intervention integrity in consultation research

(see review by Sanetti & Kratochwill, 2008) that finds an association between integrity and child outcomes. Very few research studies investigating intervention programs for children with obesity have collected information on intervention implementation integrity. However, Kalarchian and colleagues (2009) found that significant improvements in the health status of children with obesity after treatment and at follow-up were associated with higher family attendance at intervention meetings. Outcomes for this study provide additional support for the importance of understanding intervention implementation integrity and future studies should investigate the direct association between integrity and child outcomes for CBC targeting health behaviors. Future research should also identify strategies consultants can use to promote reliable intervention implementation integrity.

Intervention implementation integrity data were self-report, and families and school personnel completed daily forms indicating whether or not they carried out each plan step as designed. As a result, limitations were associated with data collected and should be interpreted with caution. For example, data were collected via self-report from families and school personnel and may be influenced by social desirability or bias. Additionally, the amount of integrity data completed by families and school personnel ranged from 32.0% to 99.5% of all possible plan steps during treatment implementation. This suggests a fair amount of missing data on treatment integrity for some participants in certain settings. It is unclear if the treatment was implemented with accuracy on the days that data were not collected. Overall, future research should build on assessment of treatment integrity by augmenting self-report measures with other methods, such as third-

party observation or collection of permanent product data (e.g., sticker charts, home-school notes).

Social Validity

Parents, school personnel, and child participants perceived CBC as an acceptable and effective intervention for health behaviors. All child participants had average item scores of less than 1.80 on a 5-point Likert scale (1 = high perceived acceptability; 5 = low perceived acceptability), indicating high perceived acceptability measured by the Children's Intervention Rating Profile (CIRP; Witt & Elliott, 1985). Parents and school personnel perceived CBC for health behaviors as highly effective and acceptable via the Behavior Intervention Rating Scale – Revised (BIRS-R; Von Brock & Elliott, 1987), with all Total BIRS-R scores less than 2.50 on a 6-point Likert scale (1 = high perceived efficacy; 6 = low perceived efficacy). Average scores for Total scores were rated, on average, slightly more acceptable and effective at school (i.e., 1.65) than home (i.e., 1.92). Relative to BIRS-R data for other participants, AN's total BIRS-R score was the least perceived efficacy score at 2.46. This is congruent with AN's individualized health behaviors at home and health status outcomes for AN which also had poorer effects compared to other participants.

On average, parents and school personnel ratings on the Goal Attainment Scale (GAS; Kiresuk, Smith, & Cardillo, 1994) indicated that health behavior goals were *mostly met* following CBC. The lowest rating was for AN's dietary behavior at school, which indicated that her goal was *partially met* at school. This indicates that all participants (with the exception of TO for whom home data were not available) partially or fully achieved personal goals developed by CBC participants.

Overall, positive perceptions were reported for CBC for health behaviors. Positive perceptions reported in this study are similar to previous social validity reports by teachers and parents that reported CBC as a preferred model of treatment to other models of consultation (Freer & Watson, 1999; Sheridan & Steck, 1995). Furthermore, other studies investigating the social validity of CBC for academic, behavioral, and social targets have reported similar outcomes (Sheridan et al., 2001; Sheridan et al., 2004) and this study adds to the continued support for the acceptability and effectiveness of the CBC model. AN appeared to have the lowest reported acceptability, effectiveness, and goal attainment; although, scores continued to be in the highly socially valid range. It is important to note that AN's family also had poor treatment integrity, home health behavior, and health status outcomes. Future research may continue to expand on the perceived social validity of the intervention to investigate family and school participants' perception of their joint relationship or partnership before, during, and after the CBC process. It is possible that the perceived collaborative nature of the CBC process may relate to outcomes for children.

Interesting Findings

There were several interesting findings from this study that reached beyond the initial research questions. Due to the clinical nature of this research study, the traditional CBC model was altered to meet the needs of the families and school personnel. However, TO's mother chose to withdraw from the study following the second CNAI meeting. Consequently, the remainder of the CBC process was carried out in the school environment only. Results indicated that TO's school nurse successfully improved TO's health behaviors at school regardless of the lack of involvement of TO's mother.

However, it is important to note the lack of effect of CBC on TO's health status. It may be that CBC is effective for improving health behaviors when only one setting is involved; however, both environments are essential to make lasting changes in health status.

Another interesting finding is that this program resulted in expanded services for children with obesity at TO's school. Following the termination CBC (and follow-up data collection), TO's school nurse reported that TO's school started a Healthy Lifestyle Club that promoted healthy behaviors using strategies the nurse had learned during CBC. She reported that TO as well as other staff and students participated in the club after school. This anecdotal information provides evidence for the maintenance of positive health behavior changes made during the CBC process for all participants. This echoes Cook-Cottone and colleagues (2009) who reported that effective school-based intervention programs for children with obesity involved collaboration between intervention specialist and teachers.

Study Evaluation

Strengths

The purpose of this study was to evaluate the efficacy of CBC in improving child health behaviors and health status. Treatments that meaningfully involve individuals in the child's microsystems in behavioral treatments for children with obesity have been found to result in improved outcomes for children (Berry et al., 2004; Young, Northern, Lister, Drummond, & O'Brien, 2007). However, relatively few studies have involved both parents and school personnel mutually in treatment efforts, particularly within the schools (Boon & Clydesdale, 2005; Campbell et al., 2001; Cook-Cottone et al., 2009;

Doak et al., 2006; Pyle et al., 2006; Sharma, 2006; Veugelers & Fitzgerald, 2005). This was the first known study to implement a treatment program for children with obesity that collaboratively involved both the home and school microsystems.

CBC provides an ideal model for delivering collaborative, comprehensive treatment strategies to improve the health behaviors of children. Only one previous study has investigated the efficacy of CBC for health-related behavioral concerns (i.e., monitoring of blood glucose levels; Lasecki et al., 2008), and no former studies have implemented CBC for children with obesity. This study applied CBC to a new sample of children with obesity. The efficacy of CBC for the health behaviors and health status of children with obesity was mixed, but promising. More research is necessary to better understand how CBC can be used to improve the health behaviors and status of children with obesity. Nevertheless, all participating parents, school personnel, and **c**hild participants perceived CBC as effective and acceptable for targeting health behaviors. Therefore, it appears that CBC is a useful and promising intervention for improving the health behaviors and health status of children with obesity.

This study also collected information on intervention implementation integrity. The importance of investigating integrity in behavioral consultation models as well as the association between integrity and child outcomes has been documented (Sanetti & Kratochwill, 2008). However, no previous childhood obesity studies involving parents and/or school personnel as the agents of health behavior changes for the child examined the integrity with which treatments were implemented. This study addressed this gap in the literature by collecting information on the intervention implementation integrity of the participating parents and school personnel. Anecdotally, child participants whose

family and school personnel had low intervention implementation integrity also had poorer health status outcomes. Future studies should directly assess the impact of treatment integrity on child outcomes for larger samples of children with obesity.

The multiple baseline design is also a strength of this study. For each participant, the multi-component intervention package was implemented via CBC across two individualized health behaviors (i.e., one dietary, one physical activity). The multiple baseline design allowed for the examination of the intervention package via CBC across time and behaviors. Each participant served as her own control through the systematic manipulation of the application of the health behavior intervention within CBC to each health behavior, while all other variables were held constant. This process was replicated across all four participants and across environments to further demonstrate experimental control. A systematic change was observed via visual inspection when the intervention was applied for YB's individualized health behaviors at home and school and AN and TO's health behaviors at school. Therefore, it was evident that changes in health behaviors were attributable to the application of the intervention rather than to extraneous events. A multiple baseline approach is the most intensive and rigorous experimental design in single-subject research and has been found to be a highly reliable and valid research design (Kazdin, 1982). The multiple baseline design controls for threats to internal validity such as the effects of maturation or history.

Limitations

Multiple limitations were present throughout this study that should be considered when interpreting results. Limitations were related to three categories: design and internal validity, external validity, and measurement.

Internal validity limitations. Several limitations are related to design and internal validity. For an ideal multiple baseline design, data should be stable within each baseline phase prior to initiating the treatment phase. However, due to the clinical realities of the participants in this project and the nature of the individualized health behaviors chosen for each child, it was not always realistic to withhold treatment while waiting for stability of the data. For example, the number of minutes that YB engaged in moderate to vigorous activity at home daily varied during baseline due to uncontrollable circumstances such as illness or weather and it was not practical to delay treatment as a result. However, lack of stability of baseline data made it difficult to interpret multiple baseline data for some results.

The multiple baseline design across behaviors demonstrates control by replicating effects of the independent variable (i.e., CBC) across several dependent variables (i.e., health behaviors) over time. For this study, the effects of the intervention were only replicated once per participant. In other words, after CBC was applied to one series (e.g., dietary behavior), it was replicated with a second series (e.g., physical activity behavior). Because this study included only one series replication per participant, inconsistent effects were difficult to interpret. For example, BR's physical activity behaviors at home and school appeared to change in response to the application of the intervention; however, vegetable intake was not significantly improved in response to treatment implementation. The introduction of CBC appeared to have a functional relationship on health behavior change for one series, but not the other. As a result, the efficacy of CBC could not be determined given the inconsistent results across series. An inconsistent functional pattern across too few replications does not allow one to infer causality. Had

the effects of CBC replicated across two or more behaviors per participant, the effects of the intervention may have become more apparent. For future investigations, additional target behaviors should continue to be added (e.g., first dietary behavior, first physical activity behavior, second dietary behavior, second physical activity behavior) to infer causality.

The treatment length of the entire CBC process ranged from approximately 6 to 8 weeks. Of the follow-up data that were collected, results were mixed for health behavior and health status outcomes. Although outcomes were improved for some participants, it may be that the time period was too short to consistently impact health behaviors and, especially, health status measures such as BMI. Although CBC has traditionally been relatively brief, it may be that CBC should be lengthened for children with obesity to result in more substantial long-term changes of health habits and health status.

External validity limitations. Several limitations are related to external validity. First, for each child participant, only one dietary and physical activity behavior was identified and targeted for this study. Although broad dietary and physical activity measures were collected, it remains unclear how changes in the target health behaviors relate to other specific health behaviors. Second, the children participating in this study were all females ranging in age from 7 to 12. The results of this study can not be expanded to boys or children of other age ranges. Third, the consultant participating in this study had formal training in the CBC model, and it is unclear if this process could be replicated by an individual with less experience and training. Future studies should assess the involvement of a registered dietician on the team as a trained consultant to provide more comprehensive expertise regarding child health. Furthermore, school

nurses could be in a pivotal position to use their expertise in child health and link home and school settings to apply CBC for the health behaviors of children with obesity in the schools and communities they serve. As a result, future research and programming should provide training to a variety of professionals that may be in an ideal position to implement CBC.

Measurement limitations. Lastly, several measurement limitations should be noted in addition to the limitations described above. Observations of health behaviors and the DFR were not completely objective and were collected via observations and report by parents and school personnel. Other measures also relied on self-report, including the PAQ-C completed by children. As a result, data could be subject to social desirability or bias.

The broad measures of health behaviors had several limitations. There is a large need for better measurement tools assessing nutrition intake of children. The DFR was specifically developed for use in this study and does not have a substantial research base. More research on the psychometrics of this scale should be conducted to determine its utility in future practice and research. The PAQ-C gathered information for the previous two weeks of physical activity. As a result, it was only completed once at baseline and a stable pattern of baseline data could not be established. Changes in scores from baseline to treatment phases should be interpreted with caution. The PAQ-C and DFR are proxy measures of physical activity and dietary intake, respectively. That is, they were not direct indicators of dietary intake and physical activity and should be interpreted as such. Direct measures were unrealistic for the scope of this study, but future studies should utilize more direct measures of health behaviors.

BMI is also a proxy measure of health status. However, BMI is highly correlated with other measures of body mass, such as dual-energy X-ray absorptiometry (DXA), a measure of body density (Goran, Driscoll, Johnson, Nagy, & Hunter, 1996; Gutin et al., 1996), skinfold thickness (Gutin et al., 1996), and ultrasonographic measurements of fat thickness (Semiz et al., 2007). Also, BMI is used regularly in research investigating the effectiveness of treatment programs for children with obesity (e.g., Edwards et al., 2006; Epstein et al., 2000b; Kalavainen et al., 2007; Nemet et al., 2005; Vignolo et al., 2008). BMI is based on a child's height and weight and, therefore, does not change rapidly and was assessed every 2 weeks. Additionally, time restraints and the needs of the child and family participants did not allow for multiple assessments of child participant BMI. As a result, BMI was only assessed once at baseline, so a pattern of baseline behavior could not be established and data should be interpreted with caution.

Implications and Future Directions

Practice

An estimated 17.1% of children and adolescents ages 2 to19 years of age are obese (Ogden et al., 2006), and the prevalence of obesity in school-aged children (i.e., ages 6 to 11) has increased 14.8% in the past 30 years (Ogden et al., 2006; Ogden, Flegal, Carroll, & Johnson, 2002). Obesity is linked to numerous adverse physical, psychosocial, academic, and economic consequences for children and the communities in which they reside. Therefore, it is necessary to establish evidence-based interventions to improve the health behaviors of children with obesity to reduce the prevalence of obesity and its related negative consequences. This study suggests that CBC may be a promising

vehicle for the collaborative treatment of health behaviors and health status of children with obesity.

Given the pervasive role of parents throughout their child's life and their ability to limit or provide access to healthy foods and activities, it is important that parents participate in the treatment of obesity of their children. Furthermore, the role of school personnel is of utmost importance, as children spend a significant percentage of their daily lives at school. CBC provides a means to integrate both home and school environments to increase the likelihood of positive and lasting improvements in the health behaviors and status of children with obesity. Results from this study indicate that individuals in the home and school microsystems can successfully work together to treat obesity across environments. Furthermore, participants rated CBC as a highly effective and acceptable conduit for the treatment of obesity in children.

CBC has traditionally been used to target behavior, academic, and social targets. Results from this study and Lasecki et al. (2008) suggest that CBC can also be used to improve health behaviors. Future implementation of CBC for the health behaviors of children with obesity should continue to adjust CBC procedures to be most practical and effective for families and schools, including adjusting the length of the treatment and simplifying data collection procedures.

The four girls participating in this study were recruited from their physicians, physician's assistants, or nurse practitioners from a private group practice. CBC provides an important link between physician recommendations and lifestyle changes for children who are identified as obese. Furthermore, CBC may also be a useful mechanism for registered dieticians who frequently serve children who are overweight or obese to

encourage behavioral changes across multiple influential environments in their client's lives.

Research

Based on this pilot study, it appears that CBC may be a promising approach for the treatment of obesity in children. Similar to the research progression for the investigation of CBC for behavior, academic, and social outcomes (Colton & Sheridan, 1998; Galloway & Sheridan, 1994; Gortmaker, Warnes, & Sheridan, 2004; Sheridan, Eagle, Cowan, & Mickelson, 2001; Sheridan, Glover, Kwon, & Garbacz, 2009; Weiner, Sheridan, & Jenson, 1998), CBC for health behaviors should now be investigated with various other designs to better understand its effects. For example, additional small n studies may explore if more robust outcomes are evident if home and school personnel targeted the same health behaviors across settings. Additionally, larger scale studies with rigorous experimental methods are necessary to better understand the effects of CBC for health behaviors. To investigate causality of the efficacy of CBC for health behaviors, large scale research on this topic should be investigated using a randomized control design.

Future studies should apply CBC to a wider population to better understand the unique characteristics that may affect the variability of treatment outcomes. This study included four girls who are of Caucasian or Hispanic ethnic decent. However, future samples should include parents, school personnel, and children of various genders, ethnicities, and ages to understand for whom the CBC process is most effective. It is particularly important to determine if CBC is effective for certain populations, as the prevalence of obesity in children and adolescents varies by sex and ethnicity.

Additionally, adding a dietician to the team as a trained consultant may also be an important next step for this process to provide more comprehensive expertise regarding child health.

To accurately determine the efficacy of CBC for health behaviors, there is a need for more evidence-based treatment strategies that are implemented within the CBC model to improve specific dietary and physical behaviors of children. Furthermore, it is difficult to determine the specific program components from the multi-component intervention plan implemented within the CBC model that influenced outcomes. As a result, it is important to conduct future studies with larger samples to identify the specific program components that are most effective and influential to child outcomes as well as identify specific mediating and moderating variables impacting results.

This study evaluated intervention implementation integrity of participating parents and school personnel. It will be important for future studies implemented on a larger scale to continue this trend. Studies with larger samples should investigate the association between intervention implementation integrity and child outcomes. Studies should also investigate variables that may impact treatment integrity to identify how to improve integrity by those participating in CBC for health behaviors.

Collecting information on participants' readiness for change may have aided in the interpretation of results and should be included in future studies. It is possible that each participant's phase of readiness for change may have impacted outcomes for this study. However, few measures have been identified that classify readiness for agents of behavior change (e.g., parents, school personnel) in children. Additionally, this variable could not have been examined experimentally via the design utilized in this study. Future

research should identify or develop appropriate measures of readiness for change for behavioral consultation models and include these measures in future studies with larger samples.

A future study should also investigate the collaborative nature of CBC for health behaviors. This could be investigated in several ways. First, is important to understand changes in the quantity and quality of communication and collaboration between home and school as part of the CBC process. Second, it will also be important to investigate family and school participants' perception of their relationship prior to and following CBC to better understand the role of the collaborative relationship and child outcomes. Third, larger-scale studies will allow for the investigation of the added value for children of involving both home and school settings in a collaborative manner versus targeting one environment only.

Conclusions

Based on the data collected in this initial pilot study, it appears that CBC is a promising model for the treatment of obesity in children. Although data on health behavior and health status outcomes were varied, a substantial amount of information indicated that this program may have hope for use with children suffering from obesity. Furthermore, CBC was perceived as highly effective and acceptable by parents, school personnel, and children. As a result, the efficacy of CBC for improving health and dietary behaviors for children with obesity should be investigated further with a larger sample via randomized, controlled research designs to further its empirical base.

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Appendix A:

Conjoint Behavioral Consultation Interview Forms

Conjoint Needs Identification Interview (CNII)

Child's Name: _____ Date: _____

Parent's Name: _____ Age: _____

Teacher's Name: _____ Grade: _____

School: _____

Consultant's Name: _____

Consultant Note: The goals of the CNII are to:

Behavioral goals:

- Jointly identify and define child's health priorities in behavioral terms.
- Jointly establish a procedure to collect baseline data across setting.

Relationship building goals:

- Identify strengths of the child, family, and school.
- Establish joint responsibility in goal setting and decision making.
- Establish/improve working relationships between parents and teacher, and between the consultant and consultees.
- Validate shared goals of supporting the child.
- Increase communication and knowledge regarding the child, goals, concerns, and culture of family and school.

Consultant and Case Goals for Interview:

_____

_____

_____

_____

_____

_____

_____

Conjoint Needs Identification Interview (CNII)

SOCIAL OPENING

Establish a friendly supportive atmosphere (e.g., position of the chairs, nonverbal communication); demonstrate interest for the consultee (e.g., ask about past events)

Notes:

OPEN UP DIALOGUE

Establish the attitude that everyone's information is vital; use inclusive language; emphasize the expertise of everyone involved; discuss the importance and roles of each participant (i.e., provide information, collect/set-up assessment and observations); discuss steps of the meeting

Notes:

DISCUSS CHILD, FAMILY, AND TEACHER STRENGTHS

Discuss things that are going well; discuss likes and dislikes; establish importance of building upon strengths of all when addressing priorities

Notes:

Home School

DISCUSS GOALS AND DESIRES

Discuss goals, aspirations, and desires for the child in the short and long term; emphasize importance of consultees' identified goals and sharing of information regarding developmental appropriateness of expectations; emphasize importance of CBC process to reach goals

Notes:

Home | School

SELECT NEEDS

Discuss what might get in the way of the goals and desires; explore general concerns related to health behaviors

Notes:

Home | School

SUMMARIZE/Validate Goals and Needs. Begin building a bridge for shared goals and cross-setting similarities.

SELECT/DEFINE THE PRIORITY

Discuss importance of selecting one priority dietary behavior and one priority physical activity behavior; select which behavior to start with (based on identified goals and desires); define priority behaviors in concrete, observable terms

Notes:

Home | School

SUMMARIZE/Validate the definition of the priority

SELECT A FOCUS/SETTING

Discuss importance of focus; answer where and when the priority behavior occurs in specific terms; select a focus or a place to start

Notes:

Home | School

WHAT WORKS/WHAT DOESN'T?

Discuss what has already been tried; point out strengths from what has already worked to be used later in coming up with a plan; emphasize strengths of consultees

Notes:

Home	School

COLLECT INFORMATION

Discuss the rationale for collecting information; select a specific time, place and procedure; provide consultees with charts to record information; discuss rationale of watching what happens before and after the priority behavior, as well as specific patterns that occur; establish times for consultant to observe

Notes:

	Home	School
What will be observed?		
Where will observation occur?		
How will it be recorded?		
When will observation begin?		

Provide parents and teachers with data collection forms

SUMMARIZE/Validate Data Collection Procedures

MEET AGAIN

Discuss steps of the next meeting, establish time and place to meet

CLOSING

Summarize what was accomplished at the meeting, emphasizing consultees' expertise, strengths, and how this information will help the child to be successful; exchange phone numbers and e-mail addresses; let parents and teachers know they are free to contact you with questions and concerns and remind them you will check in to see how information gathering is going

Conjoint Needs Analysis Interview (CNAI)

Child's Name: _____ Date: _____

Parent's Name: _____ Age: _____

Teacher's Name: _____ Grade: _____

School: _____

Consultant's Name: _____

Consultant Note: The goals of the CNAI are to:

Behavioral goals:

- Evaluate health behavior information collected across home and school.
- Collaboratively develop developmentally appropriate goals for first priority behavior across home and school.
- Discuss what is happening before and after the priority behavior, as well as specific patterns that occur, during the focused time/setting.
- Collaboratively develop a plan built upon strengths and competencies to address the priority behavior across home and school.
- Reaffirm information collection procedures.

Relationship building goals:

- Use inclusive language to strengthen partnerships between home and school
- Encourage and validate sharing of parents' and teachers' perspectives of the priority behavior
- Foster an environment that facilitates "give-and-take" communication across settings.
- Promote collaborative decision-making and shared responsibility for plan development.

Consultant and Case Goals for Interview:

_____

_____

_____

Conjoint Needs Analysis Interview (CNAI)

SOCIAL OPENING

Establish a friendly supportive atmosphere (e.g., position of the chairs, nonverbal communication); demonstrate interest for the consultee (e.g., ask about past events)

Notes:

OPEN UP DIALOGUE

Re-emphasize the attitude that everyone's input is vital; continue to use inclusive language; discuss steps of the meeting

Notes:

DISCUSS INFORMATION COLLECTED/SET GOALS

Restate the definition of the priority dietary and physical activity behaviors; discuss information collected; set jointly determined, developmentally appropriate goals (based on information collected) for both health behaviors

Notes:

Home

School

SUMMARIZE information collected and connect to goals set

WHAT'S HAPPENING?

Discuss what is happening before and after both priority behaviors, as well as specific patterns that occur, during the focused time/setting; emphasize this information will help to understand why these behavior are happening and how changes can be made

1st BEHAVIOR:

Before

Notes :

Home | School

After

Notes :

Home | School

Other Patterns

Notes :

Home | School

2ND BEHAVIOR:

Before

Notes :

Home | School

After

Notes :

Home | School

Other Patterns

Notes :

Home | School

WHY IS IT HAPPENING?

Summarize information gathered for each behavior, as well as what's happening during the focused time/setting (organize and summarize relevant information such as attention that is given, key people that affect the occurrence of the priority behavior, skills needed to perform the desired behavior); discuss reasons why the priority behaviors are happening

1st BEHAVIOR:

Notes:

Home | School

2nd BEHAVIOR:

Notes:

Home | School

WHAT TO DO (1st PRIORITY BEHAVIOR)?

Select a focus for change based on why the first priority behavior is happening; restate child, teacher and family strengths; jointly develop a plan across home and school including (a) education for participating children, families, and school personnel, (b) behavior modification, and (c) home-school communication; write down a summary of steps of the plan for parents and teachers; provide an opportunity for parents and teachers to ask questions; model plan procedures if necessary

Notes:

Home | School

Summarize plan; Provide parents and teachers with Plan Worksheet

COLLECT INFORMATION

Re-emphasize the rationale for collecting information; select a specific time, place and procedure; provide parents and teachers with charts to record information

Notes:

	Home	School
What will be observed?		
Where will observation occur?		
How will it be recorded?		
When will observation begin?		

SUMMARIZE/Validate Data Collection Procedures
Provide parents and teachers with data collection form

MEET AGAIN

Discuss steps of the next meeting; establish time and place to meet

CLOSING

Summarize what was accomplished at the meeting, emphasizing consultees' expertise, strengths, and how this information will help the child to be successful and meet his or her goals; let consultees know they are free to contact you with questions and concerns and remind them you will communicate frequently to see how the plan is going

Notes:

Conjoint Plan Evaluation Interview (CPEI) 1

Child's Name: _____ Date: _____

Parent's Name: _____ Age: _____

Teacher's Name: _____ Grade: _____

School: _____

Consultant's Name: _____

Consultant Note: The goals of the CPEI are to:

Behavioral goals:

- Evaluate health behavior information collected across home and school.
- Determine if the goals for the first priority health behavior have been met.
- Evaluate what worked and what didn't.
- Discuss continuation or termination of plan for first priority behavior.
- Review second priority behavior goals, what is happening before and after and patterns, and focused time/setting.
- Collaboratively develop a plan built upon strengths and competencies to address the second priority behavior across home and school.
- Reaffirm information collection procedures.

Relationship building goals:

- Continue to use inclusive language.
- Encourage and validate sharing of parents' and teachers' perspectives of the health behaviors.
- Foster an environment that facilitates "give-and-take" communication across settings.
- Promote collaborative decision-making and shared responsibility for plan development.
- Continue to promote open communication and collaborative decision-making across the home and school settings.
- Discuss caregivers' and teachers' perceptions of the plan and process.

Consultant and Case Goals for Interview:

_____

_____

Conjoint Plan Evaluation Interview (CPEI)

SOCIAL OPENING

Establish a friendly supportive atmosphere (e.g., position of the chairs, nonverbal communication); demonstrate interest for the consultee (e.g., ask about past events)

Notes:

OPEN UP DIALOGUE

Re-emphasize the attitude that everyone's input is vital; continue to use inclusive language; discuss steps of the meeting

Notes:

HOW DID THE PLAN WORK FOR THE FIRST PRIORITY BEHAVIOR?

Restate the plan for the first priority health behavior and identified goals; discuss how the plan worked and if the goals were met; decide where to go from here (e.g.., modify plan, set a new goal, use plan in another setting, end consultation)

Notes:

Home	School

SUMMARIZE information collected and connect to goals set

CHANGE PLAN

Discuss what worked and what didn't, emphasizing strengths of the plan; it may be necessary to re-evaluate what is happening before and after, as well as specific patterns, and why the priority behavior is occurring; refer to previous interview forms

Notes:

Home | School

CONTINUE THE PLAN

Discuss how to continue positive changes over time; discuss continuing the plan (e.g., other times and settings) OR gradually removing the plan

Notes:

Home | School

WHAT WORKED/WHAT DIDN'T

Summarize the plan and the partnership building process, emphasizing collaborative decision making, strengths, expertise, and home school communication; discuss what caregivers and teachers thought about why the behavior changed, as well as what worked and what didn't with the plan and the process; discuss how you might use similar ideas to address the second priority health behavior and future needs

Notes:

Home | School

REVIEW 2ND HEALTH BEHAVIOR

Restate the definition of the second priority health behavior; review jointly determined, developmentally appropriate goals (based on information collected), what happens before, after, and patterns, and why the behavior is occurring; discuss information collected; encourage consultees to share updated information regarding the second priority behavior

Notes:

Home | School

SUMMARIZE information collected and goals set

WHAT TO DO?

Select a focus for change based on why the second priority behavior is happening; restate child, teacher and family strengths; jointly develop a plan across home and school, including (a) education for participating children, families, and school personnel, (b) behavior modification, and (c) home-school communication; write down a summary of steps of the plan for parents and teachers; provide an opportunity for parents and teachers to ask questions; model plan procedures if necessary

Notes:

Home School

Summarize plan; Provide parents and teachers with Plan Worksheet

COLLECT INFORMATION

Re-emphasize the rationale for collecting information; select a specific time, place and procedure; provide parents and teachers with charts to record information

Notes:

	Home	School
What will be observed?		
Where will observation occur?		
How will it be recorded?		
When will observation begin?		

SUMMARIZE/Validate Data Collection Procedures
Provide parents and teachers with data collection form

MEET AGAIN

Discuss steps of the next meeting; establish time and place to meet

CLOSING

Summarize what was accomplished at the meeting, emphasizing consultees' expertise, strengths, and how this information will help the child to be successful and meet his or her goals; let consultees know they are free to contact you with questions and concerns and remind them you will communicate frequently to see how the plan is going

Notes:

Conjoint Plan Evaluation Interview (CPEI)

Child's Name: _____ Date: _____

Parent's Name: _____ Age: _____

Teacher's Name: _____ Grade: _____

School: _____

Consultant's Name: _____

Consultant Note: The goals of the CPEI are to:

Behavioral goals:

- Determine if the goals for the priority behaviors have been met.
- Evaluate what worked and what didn't.
- Discuss continuation or termination of plan.
- Schedule additional interview if necessary, or terminate consultation.

Relationship building goals:

- Continue to promote open communication and collaborative decision-making across the home and school settings
- Reinforce joint efforts in addressing needs
- Discuss caregivers' and teachers' perceptions of the plan and process
- Reinforce caregivers' and teachers' strengths and competencies for addressing future needs for the child
- Establish means for caregivers and teachers to continue to partner in the future

Consultant and Case Goals for Interview:

_____

_____

_____

_____

Conjoint Plan Evaluation Interview (CPEI) 2

SOCIAL OPENING

Establish a friendly supportive atmosphere (e.g., position of the chairs, nonverbal communication); demonstrate interest for the consultee (e.g., ask about past events)

Notes:

OPEN UP DIALOGUE

Re-emphasize the attitude that everyone's input is vital; continue to use inclusive language; discuss steps of the meeting

Notes:

HOW DID IT WORK/WHAT HAPPENED?

Restate the plans and the goals; discuss how the plan worked and if the goals were met; decide where to go from here (e.g.., modify plan, set a new goal, use plan in another setting, end consultation)

Notes:

Home	School

CHANGE PLAN

Discuss what worked and what didn't, emphasizing strengths of the plan; it may be necessary to re-evaluate what is happening before and after, as well as specific patterns, and why the priority behavior is occurring; refer to previous interview forms

Notes:

Home | School

CONTINUE THE PLAN

Discuss how to continue positive changes over time; discuss continuing the plan (e.g., other times and settings) OR gradually removing the plan

Notes:

Home | School

DISCUSS NEED FOR FUTURE MEETING

Discuss if a formal meeting is necessary; discuss informal methods (e.g., e-mail, phone calls, home school notes), emphasizing the value of continued communication; discuss plan for follow-up and provide caregivers and teachers with extra plan worksheets and data collection forms

Notes:

Home | School

WHAT WORKED/WHAT DIDN'T

Summarize the plan and the partnership building process, emphasizing collaborative decision making, strengths, expertise, and home school communication; discuss what caregivers and teachers thought about why the behavior changed, as well as what worked and what didn't with the plan and the process; discuss how you might use similar ideas to address future needs, emphasizing specific plans to address priorities, as well as the collaborative decision-making process; discuss if caregivers and teachers were satisfied with the results

Notes:

Home | School

END CONSULTATION

Discuss ways to keep in touch with the consultant and with each other

Appendix B:

Physical Activity Questionnaire for Children (PAQ-C)

Physical Activity Questionnaire (Elementary School)

Name:_____ Age:_____ Date:_____
Sex: M_____ F_____ Grade:_____
Teacher:_____

We are trying to find out about your level of physical activity from ***the last 7 days*** (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right and wrong answers — this is not a test.
2. Please answer all the questions as honestly and accurately as you can — this is very important.

1. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Check one only.)

I don't do PE ..... ❍
Hardly ever ..... ❍
Sometimes ..... ❍
Quite often ..... ❍
Always ..... ❍

2. In the last 7 days, what did you do most of the time *at recess*? (Check one only.)

Sat down (talking, reading, doing schoolwork) ❍
Stood around or walked around…..... ❍
Ran or played a little bit……..... ❍
Ran around a played quite a bit……..... ❍
Ran and played hard most of the time……... ❍

3. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? (Check one only.)

Sat down (talking, reading, doing schoolwork) ❍
Stood around or walked around…..... ❍
Ran or played a little bit……..... ❍
Ran around a played quite a bit……..... ❍
Ran and played hard most of the time……... ❍

4. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Check one only.)

None…….. ❍
1 time last week……..... ❍
2 or 3 times last week……..... ❍
4 times last week……...……..... ❍
5 times last week……... ❍

5. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? (Check one only.)

None…….. ❍
1 time last week……..... ❍
2 or 3 times last week……..... ❍
4 or 5 times last week……...……..... ❍
6 or 7 times last week……... ❍

6. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Check one only.)

None…….. ❍
1 time……..... ❍
2 - 3 times ……..……..... ❍
4 - 5 times ……...……..... ❍
6 or more times ……..……... ❍

7. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

A. All or most of my free time was spent doing things that involve little physical effort……. ❍
B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g. played sports, went running, swimming, bike riding, did aerobics)…… ❍
C. I often (3 — 4 times last week) did physical things in my free time…….. ❍
D. I quite often (5 — 6 times last week) did physical things in my free time……. ❍
E. I very often (7 or more times last week) did physical things in my free time…. ❍

8. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very often
Monday ……..	❍	❍	❍	❍	❍
Tuesday……...	❍	❍	❍	❍	❍
Wednesday……..	❍	❍	❍	❍	❍
Thursday…….	❍	❍	❍	❍	❍
Friday…….	❍	❍	❍	❍	❍
Saturday……..	❍	❍	❍	❍	❍
Sunday……	❍	❍	❍	❍	❍

9. Were you sick last week, or did anything prevent you from doing your normal physical activities? (Check one.)

Yes…….. ❍
No……. ❍

If Yes, what prevented you? _____

Appendix C:

The *Daily Food Report*

Daily Food Report

Child Name:_____ **Date**: _____

Review the entire list of items below. Indicate which, if any, of the food selections you consumed in the previous 24 hours. You do not need to provide quantities, only intake or no-intake.

___Peas, lima beans, or corn 

___Mayonnaise or Miracle Whip 

___Broccoli or cauliflower 

___Rice (white, brown, or wild) 

___Grapes or cherries 

___Dried fruit (i.e., raisins, dates, or prunes) 

___Celery 

___Ice cream, frozen yogurt, or pudding 

___Fried potatoes (i.e., French Fries, tater tots, hash browns) 

___Pasta, noodles, or macaroni 

___Apple 

___Banana 

___Pretzels 

___Strawberries or other berries 

___Peanut butter 

___Tomatoes 

___Fried, breaded fish, or fish sticks 

___Orange 

___Popcorn: micro waved, pre-popped, or flavored (not plain air-popped) 

___Skim milk 

___Fried chicken or chicken with skin, including chicken wings and chicken nuggets 

___Pop-tart, pastry, doughnut, or doughnut holes 

___Tortilla shell – corn or flour, soft 

___Cream cheese 

___Oatmeal - unsweetened

___Sour cream

___ Carrots

___Candy

___Bread (white, whole wheat, rye)

___Salad dressing, any type

___Cantaloupe, watermelon, or other melon

___Chocolate milk

___Cookies (any type), cake, or cupcake

___Potatoes, yams, or sweet potatoes: mashed, boiled, or baked (Not fried)

___lettuce, any type

___Bacon

___Muffin

___Salted or unsalted chips, nacho chips, corn chips, cheese doodles, Doritos

___Mushrooms, peppers, or onions

___Roll, plain, small (without butter)

___Sausage or pepperoni (other than on pizza)

___Sweetened beverage (e.g., Gatorade, Kool-Aid, soda pop, lemonade, Sunny Delight)

___Hamburger, hot dogs, or luncheon meats (e.g., salami, bologna)

___Pizza, any type

__Applesauce

___Pie, any type, including fruit or cheese cake

___Taco shell, hard

___Syrup

___Graham crackers

___Ramen noodles

___Cereal:

WHAT KIND?

_____

_____

Appendix D:

The *Behavior Intervention Rating Scale – Revised (BIRS-R)*

Behavior Intervention Rating Scale (BIRS-R)

We are interested in learning your ideas about the program that you are now finishing. For each item below, please circle the number that describes how much you agree or disagree with the statement. Use the following guide:

1 = I agree very much
2 = I agree
3 = I sort of agree
4 = I sort of disagree
5 = I disagree
6 = I disagree very much

1. This was an acceptable intervention for the child's health behaviors	1	2	3	4	5	6
2. Most teachers/parents would find this intervention appropriate for health problems in addition to the ones addressed	1	2	3	4	5	6
3. The intervention was effective in changing the identified health behaviors	1	2	3	4	5	6
4. I would suggest the use of this intervention to other teachers/parents	1	2	3	4	5	6
5. The child's health was severe enough to warrant use of this intervention	1	2	3	4	5	6
6. Most teachers/parents would find this intervention suitable for the health behaviors addressed	1	2	3	4	5	6
7. I would be willing to use this intervention in the classroom setting/at home again	1	2	3	4	5	6
8. The intervention did <u>not</u> result in negative side-effects for the child	1	2	3	4	5	6
9. The intervention would be appropriate for other of children	1	2	3	4	5	6
10. This intervention is consistent with those I have tried in classroom settings/at home	1	2	3	4	5	6
11. This intervention was a fair way to handle the child's health	1	2	3	4	5	6
12. This intervention was reasonable for the health behaviors addressed	1	2	3	4	5	6

13. I liked the procedures used in this intervention	1	2	3	4	5	6
14. This intervention was a good way to handle the identified health behaviors	1	2	3	4	5	6
15. Using this intervention not only improved the child's health behaviors in the classroom/at home, but also in other settings	1	2	3	4	5	6
16. Overall, the intervention was beneficial for the child	1	2	3	4	5	6
17. The child's health behaviors will remain at an improved level even after the intervention is discontinued	1	2	3	4	5	6
18. The intervention produced a lasting improvement in the child's health behaviors	1	2	3	4	5	6
19. When comparing this child with a peer before and after use of the intervention, the child's and the peer's health behaviors were more alike after using the intervention	1	2	3	4	5	6
20. This intervention produced enough improvement in the child's health behaviors so that the behaviors no longer are a problem	1	2	3	4	5	6
21. Other health behaviors related to the identified target health behaviors also are likely to be improved by the intervention	1	2	3	4	5	6
22. The intervention quickly improved the child's health behavior	1	2	3	4	5	6
23. Soon after using the intervention, a positive change in the health behavior was noticed	1	2	3	4	5	6
24. The intervention improved the child the child's health behaviors to the point that it would not noticeably deviate from other classmates' behavior	1	2	3	4	5	6

Appendix E:

Child Intervention Rating Profile (CIRP)

Name:_____

Date:_____

Children's Intervention Rating Profile

We are interested in learning your ideas about the program that you are now finishing. Below are some sentences. You may or may not agree with the sentences. For each one, please circle the number that describes how much you agree or disagree with the statement. Use the following guide:

1 = I agree very much
2 = I sort of agree
3 = I don't agree or disagree
4 = I sort of disagree
5 = I disagree very much

1. The things used to improve my health behaviors were fair.	1	2	3	4	5
2. My parent/teacher were too harsh on me.	1	2	3	4	5
3. The things used to improve my health behaviors may cause problems with my friends.	1	2	3	4	5
4. There are better ways to improve health behaviors than the one used.	1	2	3	4	5
5. The things used would be good to use with other children.	1	2	3	4	5
6. I like the things used to improve my health behaviors.	1	2	3	4	5
7. I think that the things used for health behaviors would help other children to do better in school.	1	2	3	4	5

Appendix F:

Goal Attainment Scaling (GAS)

Goal Attainment Scaling

Child's name:

Rater's name:

Health behavior class (circle): dietary physical activity

Target behavior: _____

Target behavior goal: _____

Please use the following scale to rate how closely the child came to meeting his/her goal (circle one).

|_____|_____|_____|_____|_____|_____|_____|

-3	-2	-1	0	+1	+2	+3
Situation significantly worse	Situation somewhat worse	Situation a little worse	No progress	Goal partially met	Goal mostly met	Goal completely met

Appendix G:

CBC Objective Checklists

Consultant's Name: _____
Observer's Name: _____
Date: _____

CBC Objectives Checklist
Conjoint Needs Identification Interview (CNII)

Instructions:

Listen to the audiotaped CNII provided. Place a checkmark on the line to the left of each item that you believe is addressed by the consultant. If information is obtained from the parent, place a check in the "home" column. If information is obtained from the teacher, or school personnel, place a check in the "school" column. In some cases, the information will be provided by the consultee without the consultant asking for it. In these cases, the consultant should summarize or repeat the information to the consultee.

Home	School	Objective
_____	_____	1. Discuss Strengths
_____	_____	2. Discuss Goals and Desires
_____	_____	3. Select Needs
_____	_____	4. Select/Define the Priority
_____	_____	5. Select a Focus/Setting
_____	_____	6. Discuss What Works/What Doesn't
_____	_____	7. Collect Assessment Information to Increase Understanding
_____	_____	8. Discuss a Time to Meet Again

_____ Total home _____ Total school

Divide each by 8

PERCENT OF OBJECTIVES MET:

_____ % Home _____ % School

Consultant's Name: _____
Observer's Name: _____
Date: _____

CBC Objectives Checklist
Conjoint Needs Analysis Interview (CNAI)

Instructions:

Listen to the audiotaped CNAI provided. Place a checkmark on the line to the left of each item that you believe is addressed by the consultant. If information is obtained from the parent, place a check in the "home" column. If information is obtained from the teacher, or school personnel, place a check in the "school" column. In some cases, the information will be provided by the consultee without the consultant asking for it. In these cases, the consultant should summarize or repeat the information to the consultee.

Home	School	Objective
_____	_____	1. Discuss Information Collected and Set Goals for Child
_____	_____	2. Determine What May be Contributing
_____	_____	3. Develop a Shared Understanding of Child
_____	_____	4. Use Observations and Shared Understanding to Brainstorm Ideas for a Home-School Plan
_____	_____	5. Develop Agreed-upon Strategies to Use at Home and School
_____	_____	6. Continue to Collect Information to Monitor Child's Progress toward Meeting Goal
_____ Total home	_____ Total school	

Divide each by 6

PERCENT OF OBJECTIVES MET:

_____ % Home _____ % School

Consultant's Name: _____
Observer's Name: _____
Date: _____

CBC Objectives Checklist
Conjoint Plan Evaluation Interview (CPEI) 1

Instructions:

Listen to the audiotaped CPEI provided. Place a checkmark on the line to the left of each item that you believe is addressed by the consultant. If information is obtained from the parent, place a check in the "home" column. If information is obtained from the teacher, place a check in the "school" column. In some cases, the information will be provided by the consultee without the consultant asking for it. In these cases, the consultant should summarize or repeat the information to the consultee.

Home	School	Objective
_____	_____	1. Discuss What Happened/How the Plan Worked at Home and School
_____	_____	2. Identify What Worked and What Didn't
_____	_____	3. Determine Need to Continue or Change the Plan
_____	_____	4. Review Information Collected, Goals, and Contributing Factors for Second behavior.
_____	_____	5. Use Observations and Shared Understanding to Brainstorm Ideas for a Home-School Plan
_____	_____	6. Develop Agreed-upon Strategies to Use at Home and School
_____	_____	7. Continue to Collect Information to Monitor Child's Progress toward Meeting Goal
_____ Total home	_____ Total school	

Divide each by 7

PERCENT OF OBJECTIVES MET:

_____ % Home _____ % School

Consultant's Name: _____
Observer's Name: _____
Date: _____

CBC Objectives Checklist
Conjoint Plan Evaluation Interview (CPEI) 2

Instructions:

Listen to the audiotaped CPEI provided. Place a checkmark on the line to the left of each item that you believe is addressed by the consultant. If information is obtained from the parent, place a check in the "home" column. If information is obtained from the teacher, or school personnel, place a check in the "school" column. In some cases, the information will be provided by the consultee without the consultant asking for it. In these cases, the consultant should summarize or repeat the information to the consultee.

Home	School	Objective
_____	_____	1. Discuss What Happened/How the Plan Worked at Home and School
_____	_____	2. Identify What Worked and What Didn't
_____	_____	3. Determine Need to Continue or Change the Plan
_____	_____	4. Discuss the Need for Future Meetings
_____	_____	5. Identify Ways to Continue to Keep in Touch
_____ Total home	_____ Total school	

Divide each by 5

PERCENT OF OBJECTIVES MET:

_____ % Home _____ % School

Appendix H:

Plan Summary Form - Example

Plan Summary Form at Home

Child's Name: BR

Please indicate if you completed each step by circling Yes or No. Circle NA if the step is not applicable due to circumstances such as schedule change or absence.

Plan Steps:	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Date:							
1. Monitored the number of minutes spent walking or biking.	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA
2. Provided a sticker/reward if BR met her goal (i.e., sticker for daily goal of 70 minutes of walking or biking, or Special Time for weekly goal of 4 days meeting daily goal); did not provide a sticker/reward if BR did not meet her goal.	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA
3. Completed home-school note.	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA
4. Sent home-school note to school with BR.	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA	Yes **No** NA